Gas Journal

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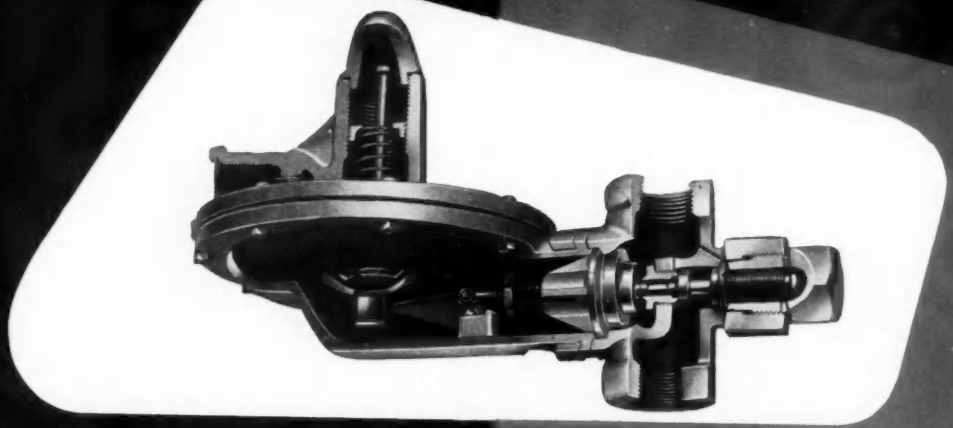

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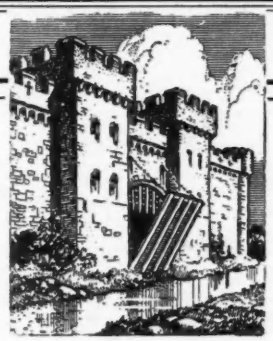

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Gas Journal

VOL. 294 NO. 4945 April 23, 1958

110TH YEAR

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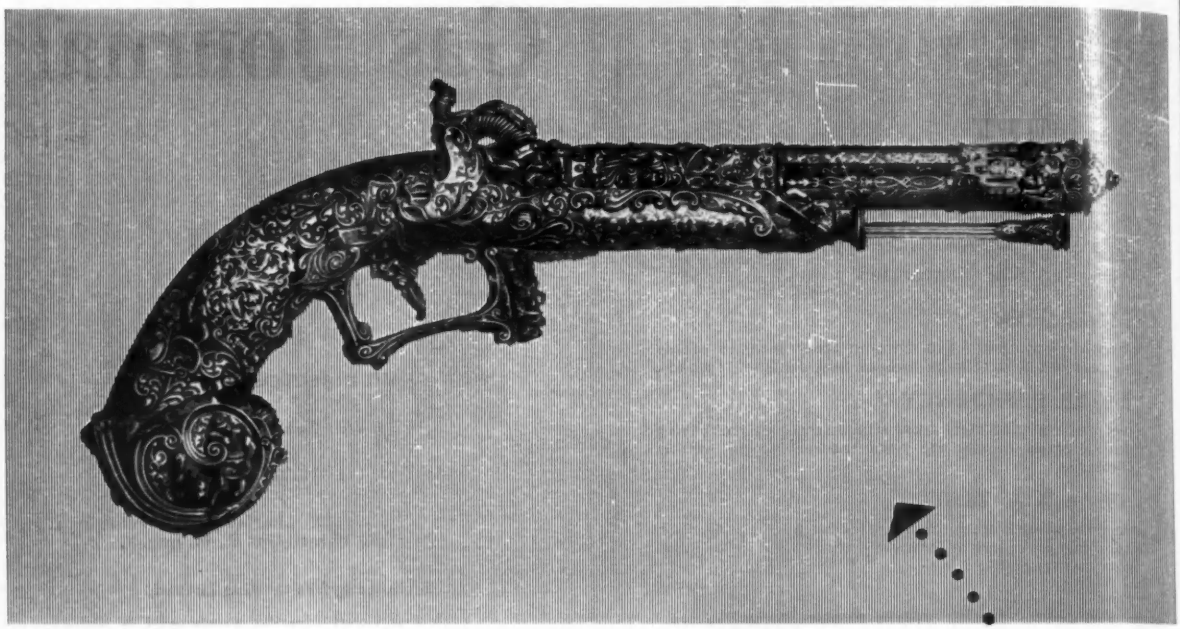

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something in common

They remind one of different worlds, the Spanish forged iron pistol of 1850 and the modern T.G. meter. Yet, they have something in common — both are the products of true craftsmanship. The pistol delicately engraved and inlaid with damascene, designed and made by Eusebio Zuloago of Madrid, is presented as a fine example of the gunsmith's skill. The T.G. meter epitomizes craftsmanship and the T.G. 'G' prepayment mechanism is accepted as the most modern precision movement on the market.
Something else in common, this Spanish pistol and a T.G. meter were both exhibited at the Great Exhibition of 1851.

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1958

Gas Journal

VOLUME 294. No. 4945. APRIL 23, 1958. 110th YEAR

Nationalised Industries' Finance

WHEN Mr. Heathcoat Amory rose to make his Budget speech last week's 'GAS JOURNAL' had already been passed for press. However, we were able to include the headlines of this clever but rather negative Budget. This week we would like to enlarge on one of the points affecting the gas industry—not the fixing of purchase tax on gas, electric and oil heaters at a level 30%, but the continuation until 1959 of the present practice of using the Exchequer as the source of capital finance for the nationalised industries.

The Chancellor said he expected the net total of expenditure below the line to be £35 mill. less than last year's out-turn. The National Coal Board was expected to need £76 mill. Issues to other nationalised industries would be £370 mill., an increase of £75 mill. over last year. The bulk of this increase was accounted for by the British Transport Commission, whose investment programme was getting into gear, and who, last year, was able to keep down its borrowings from the Exchequer by using balances which it had available at that time for investment.

Repayments by the nationalised industries in respect of earlier borrowings were, however, expected to be £16 mill. higher than last year. Finally, £61 mill. was likely to be required for the British Transport Commission under the Transport (Railway Finances) Act to meet its current deficit, as against £66 mill. last year. These capital requirements were within the limits laid down by the Government last September for investment in the public sector.

'The power to make advances from the Exchequer to the nationalised industries—other than the National Coal Board—was first given in the Finance Act of 1956,' Mr. Amory went on. 'That power expired on March 31 of this year, but was extended to August 31 by the Nationalised Industries Loans Act. Parliament passed that Act on the understanding that I would make substantive proposals in this Budget either to abandon or to continue the practice of using the Exchequer as the source of capital finance for these bodies. I have decided to recommend that the practice should continue, at any rate for another year. The reasons which led the Prime Minister the propose this course in 1956 hold good in the market conditions today. They were set out cogently in his Budget statement.'

Mr. Amory explained that it was still the case that these industries could not, in practice, borrow on their own credit. If they borrowed on Government there were decisive reasons of credit and market management for centralising the raising of the money in the Exchequer. The renewed powers, for which he proposed to move a procedure resolution, would, however, expire at August 31, 1959, so that the matter might be reviewed again in next year's Budget.

Inevitably the Chancellor's proposal was criticised in the subsequent debate. One critic was Mr. J. Grimond (Lib., Orkney and Shetland) who declared that they had to face the situation that under Conservative Governments nationalised industries would be financed permanently out of the Treasury from below the line. This habit of financing nationalised industries out of the Exchequer should stop. It was, however, to be continued for at least another 18 months. Like many other things which were continued for 18 months, he feared that it was unlikely that it would stop after that. 'I should have thought,' he said, 'that the gas and electricity industries, for example, could be made to raise their money on the market, as was suggested by the committee which investigated these industries.'

Mr. David Price (Con., Eastleigh) said the real 'nigger in the woodpile' was still the high level of Government expenditure and most of that came from policy decisions. He hoped that during the next year the Chancellor would re-think out the financing of nationalised industries. He would like to see them allowed to make bigger profits and thus be self-financing at least to the extent of two-thirds, like private companies. Some members suggested going to the market, but who would buy ordinary stock in the Coal Board?

Complaints of a confused attitude towards the nationalised industries came from Mr. D. Houghton (Lab., Sowerby). 'It is idle to pretend,' he said, 'that

a nationalised industry must conduct its affairs according to commercial principles if we do not allow it to do so. If curbs are to be put on it or if owing to the nature of its business it is impossible for it to be conducted according to commercial principles—that may be likely—the sooner we recognise the nationalised industries as part of an enlarged public service and deal with the workers in them as if they were public servants, the better.'

Solid Smokeless Fuel

THIS Journal has lately published papers dealing with the production of gas from oil in comparatively small plants with high output and has expressed the view that perhaps in the not very distant future more gas will be made by these methods and it will become possible to distribute a gas of low organic sulphur content at a price substantially cheaper than that at which it is now possible to produce gas by carbonisation.

The manufacture of gas by the high pressure complete gasification processes now being developed at the Midlands Research Centre seems to show promise of being able to make use of the poorest types of coal in the production of a suitable town gas to be distributed through a national grid. A cheap, refined, gaseous fuel, of negligible sulphur content, capable of replacing all solid and liquid fuel, as the main heating medium, would be the solution of all the country's problems of smoke pollution and reliance on overseas fuel resources.

If the present progress of this development continues as it has started, such hopes for the future are likely to be realised, but full development may take a number of years. In the meantime, it is necessary that the fullest possible advantage is taken of the fuels and appliances which we now have to implement the Clean Air Act, and to implant in the mind of the housewife both the needs and the advantages of smoke suppression. It was with such feelings that we read the paper given by Dr. A. C. Monkhouse to the London and District Section of the Institution. His paper, 'The Production of Domestic Solid Smokeless Fuels,' was a review of the position at the present time of the types of solid smokeless fuel available to the domestic user and how the best use could be made of them. To many in older houses away from the town gas, coke is still looked upon as a poor relation of coal, which, if its price is low enough, it is just worth buying for a modern type of closed cooker but for little else. The installation of modern coke grates may be quite expensive if much alteration is needed to an old-fashioned fireplace—anything up to £20 according to Dr. Monkhouse—which may deter many from using coke. The cost of high volatile coke is in every case slightly higher than high temperature gas coke, but it can be burnt on an old-fashioned grate quite successfully and with greater thermal efficiency than can coal.

In new housing estates the solid fuel-burning appliances are of modern design and it is often a condition of tenancy that only smokeless fuel should be burnt. But what if older houses are included in the smoke control zone? The solution would seem to be that the modern appliances should burn only the high temperature coke and the out-of-date appliances the premium fuels. Such an arrangement, Dr. Monkhouse points out, would cost the consumer very little, if anything, in fuel over the present cost of burning coal.

For those who can afford the extra cost of the high volatile premium fuels but have installed a modern coke-burning grate, there will be the additional advantage of the much greater ignitability and quicker 'pick up' of the premium fuel.

This shortens the very noticeably chilly period which is inevitable after refuelling the open domestic coke fire, and should be a good reason for using this type of fuel.

Perhaps the greatest doubt in the minds of the general public who have become smoke pollution minded is whether enough solid smokeless fuel will be available when all the proposed smokeless zones have become an accomplished fact. In Dr. Monkhouse's opinion, there *should* be enough. There would appear to be some restriction of the high rank coals needed for the manufacture of 'Cleanglow' and 'Phimax,' but such coal would become more plentiful if it were not being already burnt as domestic coal. Low temperature carbonisation processes would be able to extend their production and the National Coal Board might be able to produce an open fire fuel either as an ovoid similar to Phurnacite or as a sintered coal-coke fuel. Supplies for the future are likely to be assured, but we think that before the whole idea of smokeless zones can be pronounced a complete success, very careful instruction must be given to the housewife. The fuel producers, with the co-operation of the local authorities, must be quite certain that she knows exactly how to use smokeless fuel to the best possible advantage so that she will never hanker after coal again. Without the full co-operation of the housewife, smokeless zones can never be made to work. This would be a pity, to say the least, since enthusiasm for smokeless air shown by so many after the great London smog of 1952, is still so very much in evidence.

Marked Down

READERS are about to see a change of style in the 'GAS JOURNAL.' That well-known—we almost said well-loved—abbreviation B.Th.U. is to have a short back and sides and appear as B.t.u. This is not because we prefer it so. On the contrary, we do not like it at all and have taken this decision only in the interests of conformity.

British Standard 1991, part 1:1954, entitled *Letter Symbols, Signs and Abbreviations, Part 1, General*, recommends such a change, the purpose being to comply with the general principle that, in abbreviations for words, including the names of units, only lower-case letters should normally be used, except for the initial letter of a proper name that customarily begins with a capital letter. The Institution of Gas Engineers, which—rightly in our view—opposed this change from long-established practice, has been reluctant to adopt the new abbreviation. However, it now states that in view of the general adoption of B.t.u. by the fuel and engineering industries and of the need for uniformity in examination questions set jointly with other professional institutions, no useful purpose would be served by further opposition.

Much as we would like to remain true to our old friend, splendid in its capital letters and graced by the lower-case h, we feel the interests of our readers would best be served if we fell into line with the Institution. Lack of uniformity in abbreviations can be very trying and should not be perpetuated simply in deference to personal preferences. All the same, we shall miss B.Th.U.

The Minister of Power, Lord Mills, is seen with members of the gas industry, after he had presented them with the British Empire Medal recently. Left to right are Mr. P. Parker, Mr. F. E. Spencer, Mr. E. J. Robson, Mr. W. R. Tizzard, Lord Mills, Mr. S. Calvert, Mr. W. N. Thomas, and Mr. G. Huggins.

Personal

MR. R. H. E. THOMAS, O.B.E., Marketing Member of the National Coal Board, has succeeded SIR HENRY JONES, M.B.E., Deputy Chairman of the Gas Council, as Chairman of the Solid Smokeless Fuels Federation At the special request of the Executive, Sir Henry Jones continued in office beyond the normal term and the election of Mr. Thomas was made possible by the National Coal Board, as a whole, recently becoming a Member of the Federation in place of the South-Western Division of the Board.

MR. R. POLLARD, Technical and Sales Manager of R. & J. Dempster Ltd., Manchester, is now based on London, and may be reached at the Company's London Office, 34, Victoria Street, S.W.1.

MR. W. STAINSBY, Education Officer of Electroflo Meters Co., Ltd., (a member of the Elliott-Automation Group) has been elected Chairman of the Education Sub-Committee of the British Instrument Makers and Control Appliance Manufacturers Association (B.I.M.C.A.M.).

Obituary

MR. J. J. COE, for many years Manager of Arundel gasworks when it was a private undertaking, has died, aged 79.

MR. H. D. DUESBURY, who was Engineer and Manager of the former Hertford Gas Company from 1902 to 1932, and was a former Hertfordshire County Councillor, has died aged 90. His death occurred on the day the last charge was put into the retorts of the Hertford gasworks, now of the Tottenham Division of the Eastern Gas Board.

MR. F. A. GULLAND, for many years Secretary of the Maidstone Gas Company, has died at the age of 84.

MR. D. W. BUNCE, Tottenham Divisional Secretary, Eastern Gas Board, has died, aged 56, after several months' illness. Mr. Bunce started as a junior clerk in 1920 with the Barnet District Gas and Water Company. In 1929, he became an outside district collector of accounts, and later head of the Manager's cash and costing department. In 1932 Mr. Bunce became Rental Superintendent of the Company and continued in that post until nationalisation. He was then transferred to the Tottenham Division of the Eastern Gas Board and became local Accountant, and later Assistant to the Divisional Secretary. In 1952 he became Divisional Secretary.

Diary of Forthcoming Events

April 24.—NORTH OF ENGLAND SECTION, I.G.E.: Three Tuns Hotel, Durham. Joint Meeting with COKE OVEN MANAGERS' ASSOCIATION (NORTHERN SECTION). 7 p.m.

April 24.—INSTITUTE OF FUEL: Connaught Rooms, Great Queen Street, London, W.C.2. Annual Luncheon, 12.30 p.m.

April 24.—INCORPORATED PLANT ENGINEERS (SHEFFIELD AND DISTRICT): Grand Hotel, Sheffield. 'Factory Services and Supplies, with Particular Reference to Gas Requirements and Installation,' by F. Dickinson 7.30 p.m.

April 24.—NORTH THAMES G.C.C.: Caxton Hall, Westminster, S.W.1. Council Meeting.

April 24.—WALES AND MONMOUTHSHIRE JUNIORS: Aberystwyth. Annual General Meeting.

April 25.—MIDLAND SECTION, I.G.E.: Hotel Leofric, Coventry. Annual General Meeting at 2.30 p.m. preceded by luncheon at 12.15 p.m.

April 25.—INSTITUTION OF MECHANICAL ENGINEERS: General Meeting including James Clayton Lecture on 'Large Pipeline Projects,' by A. C. Hartley. 6 p.m.

April 25.—SCOTTISH WESTERN JUNIORS: 9, George Square, Glasgow. Annual General Meeting. 6 p.m.

April 29.—MIDLAND JUNIORS: Birmingham. Annual General Meeting followed by Paper, 'Sulphate-Reducing Bacteria and the Gas Industry,' by T. A. Dick.

April 30.—WALES G.C.C.: County Hall, Llandrindod Wells. Meeting at 11 a.m.

April 30. — LONDON AND SOUTHERN JUNIORS: Visit to Fondu works, West Thurrock, of the Lafarge Aluminous Cement Co. Ltd.

April 30.—NATIONAL BENZOLE AND ALLIED PRODUCTS ASSOCIATION: Grosvenor Hotel, Victoria, London, S.W.1. Annual General Meeting. 2.30 p.m.

April 30. — COMBUSTION ENGINEERING ASSOCIATION (N. WESTERN REGION): Engineers' Club, Manchester. Meeting, including paper on 'The Utilisation of Small Coals,' by G. Doxey, of I.C.I., Ltd. 2.30 p.m.

May 1.—NORTH OF ENGLAND SECTION, I.G.E.: Durham. Annual General Meeting and Ladies' Day.

May 2.—INSTITUTE OF FUEL (SOUTH WALES SECTION): Cardiff. Annual General Meeting and Dinner.

May 5-6.—INSTITUTE OF FUEL: Institution of Mechanical Engineers, London. Conference on 'The Use of Small Coal —Today and Tomorrow.'

May 6. — EAST MIDLANDS G.C.C.: Smithy Row, Nottingham. 11.30 a.m.

May 7.—INSTITUTE OF FUEL: Great George Street, London, S.W.1. Meeting, including Paper on 'Improved Sampling Equipment for Solids in Flue Gases,' by Messrs. Hawksley, Badzioch, and Blackett. 5.30 p.m.

May 7. — SOUTH WESTERN SECTION, I.G.E.: Boscawen Street, Truro. 'Gas Production in Cornwall," by W. Dougall. Followed by a visit to Newham gas manufacturing station, Truro. 11 a.m.

RIVER INDUS ALTERS COURSE OF PAKISTAN NATURAL GAS

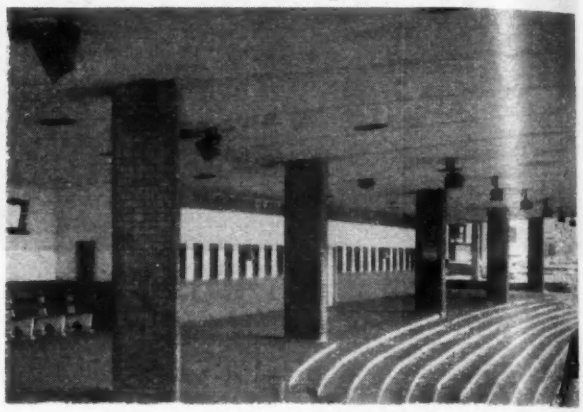
THE River Indus has meant a change of plan in the completing of the 16-in. 200-mile natural gas pipeline between Sui and Multan in West Pakistan.

Welding Supervision Ltd., who were responsible for the entire welding supervision and radiographic control of the welding on this long-distance transmission pipeline, are now controlling and supervising the 80-mile detour which has been necessitated by this broad and fast-flowing river.

Last year the line was taken to Kashmore on the north west bank of the Indus; some six miles away, on the other side of the river, the line started again and went on to Multan.

The alternative to the Indus crossing will be a 10-in. diameter pipe. The new link will be made between the original Sui-Karachi line and the Multan line on the south east bank of the Indus.

Gas will therefore flow from Sui, through the Sui-Karachi line to Sukkur where the link will take it to the Sui-Multan line and thence to Multan.



Clapton Stadium Management decided recently that they should give additional comfort to their patrons by the installation of overhead heating equipment around the licensed bars, buffets, and totalisator booths which may be subjected to disagreeable draughts during inclement weather. Some form of radiant heating was the obvious answer and, in conjunction with the North Thames Gas Board and Radiant-Heating, Ltd., it was decided, as an experiment, to install ten No. 5 type radiant heaters beneath the double decker stands in the 2s. 6d. enclosure—one of the most popular sites in the Stadium. Clapton Stadium are delighted with the installation, part of which is pictured here, and are planning to extend it.

Factory Law

The whole of the legal groundwork necessary to industrial managers and executives is covered in a three-day course on industrial and factory law to be given early in May by Mr. Harry Samuels, Barrister-at-Law, under the auspices of the Industrial Welfare Society.

'Modern Living'

An exhibition flat has been installed by the South Western Gas Board at their Weston-super-Mare Boulevard showrooms, to reflect the main theme of the Women's Gas Federation Conference sessions on 'Modern Living.'

Plea to Ministry

The Northern Gas Consultative Council is to make representations to the Ministry of Power for the abolition of restrictions on the renewal of equipment hired to consumers. It was stated at a meeting of the Council that on Tyneside 150,000 cookers, 50,000 fires and 15,000 water heaters were hired to consumers. Some of these appliances were old, and consumers could not hire new ones, and were therefore turning to oil.

Radio Control

The Southern Gas Board hopes to operate a fleet of wireless-equipped vehicles in the Oxford area. Application has been made to the Oxfordshire County Council planning authority for permission to erect a 50 ft. aerial on Shotover Hill, just outside the city.

The work of the W.S.L. team of engineers includes the inspection of pipe ends for damage and correct bevel; visual inspection of stringer bead welding, hot pass and capping; visual inspection of tie in welds and radiographic inspection of at least 10% of welds.

The W.S.L. system devised and operated successfully on the previous line and other projects is being used where the 'stringer bead' inspector will call for any bad stringers to be cut out as the line progresses. Any doubtful 'stringer beads' will be marked for subsequent radiography.

The 'hot pass' inspector will also call for repairs on the spot. In this way, the amount of bad welding in the line is reduced to a minimum. Radiographic examination is therefore acting more as a check on the visual examination than an overall check of welding on the line. This standard of W.S.L. system was borne out by the relatively few numbers of cut out joints on the main line to Multan last year.

To avoid job boredom and familiarity fatigue, the dual trained and experienced members of W.S.L. staff will be moved from one phase of the inspectional control to another from time to time. The 'stringer bead' inspector will be changed as little as possible.

The line is being built from the Multan line towards Sukkar and the first pipeline camp was set up near the Gudu Canal. It is expected that the camp will soon be moved to a position near Sukkur.

The first half mile was radiographed 100%. This again is normal W.S.L. procedure based on many years of experience of long distance transmission pipelines to gauge the overall standard of welding. When satisfied that the standard is sufficient the radiography was reduced to 20% and is now averaging 12%.

The welders, tested and supervised by Welding Supervision Ltd., are 15 Lebanese welders, employed by Pak Constructors, Ltd., the main contractors, some of which were employed on the previous Sui Multan.

New Flats may have Gas Heating

SOUTH SHIELDS Housing Committee is considering the installation of gas-heating in blocks of flats to be erected in the Tyne Dock area. Recently a deputation from South Shields inspected flats in the London area where similar heating has been installed.

It is understood that the cost of installing gas heating would be £100 per flat, and the cost of heating 12s. 6d. a week. South Shields is the first local authority in the North-East to consider this type of heating for new dwellings.

Delay Over Lurgi Plant Plans Angers W.M.G.B.

DISSATISFACTION was expressed at a recent meeting of the West Midlands Gas Consultative Council over delay in notifying the Board of the decision of a planning enquiry into objections to its plan to build a Lurgi gasification plant at Coleshill.

The Board was the first to sponsor the Lurgi system in this country six years ago. Since then a series of obstacles and delays over planning permission culminated in an enquiry last October.

Now, with Scottish plans for a Lurgi plant completed, West Midlands Board and council members are angry because, instead of being first in the field, they will be, as one Member put it, 'only a bad second at best.'

Once again gas appliance manufacturers gave magnificent support to the annual London Press Club ball which was held at the Dorchester Hotel on April 11. This picture shows Mrs. J. Lonsdale of Biddenham, Bedford, receiving a voucher from Mr. Reginald S. Hinder, Press and Information Officer, Gas Council, on behalf of Ascot Gas Water Heaters Ltd., for an Ascot gas sink water heater, which she won at the ball.

During the recent public schoolboys' tour of the gas industry, boys are seen learning at first hand about the many jobs undertaken by the West Midlands Gas Board's heat treatment department from its Superintendent, Mr. G. L. Moreton.

Mr. Sydney Smith, C.B.E., Chairman of The Scottish Gas Board, with the three prize-winners in the Scottish finals of the Youth in the Kitchen competition held in Glasgow on April 12. Left to right, they are Janet Morgan, of Cardenden (3rd prize); Anne Simpson of Aberdeen (1st prize), and Margaret Halliburton, of Barrhead (2nd prize).

Instruments, Electronics, and Automation

1958 EXHIBITION IS HALF AS BIG AGAIN AS LAST YEAR'S — FOREIGN FIRMS PARTICIPATE

General view of the Exhibition during the opening ceremony.

A WEEK ago today the President of the Board of Trade, Sir David Eccles, opened the second Instruments, Electronics, and Automation Exhibition at London's Olympia. The Exhibition will remain open until Friday.

More than 250 British firms are taking part, of which 25% are new exhibitors showing new products. There is also a contingent of overseas manufacturers from countries such as West Germany, Sweden, Switzerland, Holland, Denmark, Austria, and the United States. And this year's show is half as large again as last year's, which attracted more than 53,000 visitors from 81 countries.

One of the big successes of the first exhibition last year was a top-level conference, at which leading speakers from the scientific and industrial world expressed their views and made public for the first time details of many new innovations, from changes in Britain's automatic telephone system to new methods of marine radar.

The conference is being repeated, and like the Exhibition itself, is international. It is thus providing a forum for an international exchange of views by leading scientists from many countries throughout the world.

With the rapid growth of automation in the gas industry, this is an exhibition which cannot fail to be of interest. Many of the exhibitors—and their products—are familiar on gasworks throughout the country.

The Exhibition is the first major event of its kind to take place since the amalgamation, last October, of **Elliott Brothers (London) Ltd.** and **Associated Automation Ltd.**, to form **Elliott-Automation Ltd.** The E-A Group is represented by four separate stands totalling some 5,000 sq. ft. in area, and is the largest exhibitor. Other members of the Group include **Electroflo Meters Co., Ltd.**; the **Fisher Governor Co., Ltd.**; **James Gordon & Co., Ltd.**; **Panellit, Ltd.**; **Bristol's Instrument Co., Ltd.**; **Rotameter Manufacturing Co., Ltd.**; and **Sauter Controls Ltd.**

The largest of the four E-A stands has as its main theme one of the most important and basic aspects of automation, the presentation of process information for control and record purposes. The various principles and methods demonstrated, from the simplest to the most sophisticated, are related to a large and complex system specially designed for the Exhibition and embracing a number of typical processes.

On this stand, too, is a continuous efficiency computer, with automatic high-speed output typewriter, shown as part of the control system for an oil gasification plant, with a further display panel to deal with telemetry applied to remote control for a gas distribution system.

The Cambridge Instrument Co. Ltd. is exhibiting a selection of its instruments for indicating, recording, and automatic control. Among the items shown are the Cambridge programme controller, the Cambridge 'centre-line' indicator-controller, the Cambridge pocket pH meter—a new, self-contained, pocket-sized, pH meter of high stability and accuracy useful in the works, laboratory, or field, wherever spot checks are required—and various other electronic recorder-controller devices.

There is also a display of fuel efficiency and boilerhouse instruments. These are simple to install and maintain, and enable vital boiler plant data to be obtained quickly and accurately. They include instruments for gas analysis, temperature, draught and pressure control. A selection is also shown of the wide electrical and mechanical Cambridge range of primary measuring elements, and indicating, recording, and control equipment.

The British Rototherm Co. Ltd. is exhibiting a comprehensive range of dial thermometers, recorders and controllers. These include bi-metal instruments, mercury-in-steel thermometers, vapour pressure thermometers, and mercury-in-steel temperature recorders.

Also to be seen is an extensive and interesting range of compact on/off controllers, available as special purpose, recording, indicating and non-indicating models with fixed or variable differentials, pressure recorders with single and dual pen pressure, vacuum and compound, and domestic thermometers for all domestic purposes, including oven, refrigerator, desk, etc.

The principal theme of the **George Kent** stand is the Commander range of

instrumentation, with a representative selection of its many variations. The main section is devoted to flow measurement and control but also includes the recently introduced Commander KE high - speed self - balancing electronic recorders.

Of particular interest is the new miniature glass-electrode primary element for the Kent Universal pH recorder, a smaller version of the current model. Its principal advantages are that by utilising a reproducible single seal of the metal-to-metal type between the electrode unit and the body, an assembly has been produced that is completely impervious to water vapour and can be totally immersed in boiling solutions for long periods, very little maintenance being required.

The equipment has been designed to cover a wide range of uses in industrial pH measurement. The sensitivity of the system makes possible the use of electrodes which are very robust and long-lasting.

Elga Products Ltd., show new developments in their ion exchange and control equipment. Ion exchange and deionisation are now established techniques wherever research is carried out and equal in importance the classical processes of precipitation and filtration. Deionisation has taken the place of distillation with dramatic simplicity.

Elgastat deionisers are in universal use in academic, industrial, and research laboratories. For field research where neither power nor tap water are available the Elgastat field research unit presents a practical solution for the provision of distilled water on location.

The Company is exhibiting numerous units for the first time.

Installation at Lloyds

Honeywell Brown, Ltd., show a wide range of their electronic control equipment. This company supplied the 257 thermostats co-ordinated by an electronic control system to maintain comfortable temperatures and humidities throughout the recently opened new Lloyd's building.

In this installation, remote adjustment of certain thermostat settings is made possible by a central 'graphic' control panel. The remote controls form part of a diagram showing the entire heating and air conditioning plant.

Records of space conditions in all main areas are continuously plotted on the strip charts of eight electronic recorders situated in the control room adjacent to the graphic panel. An electronic multi-point precision indicator permits spot checks on conditions in areas not covered by the recorders.

A comprehensive range of electrical testing, servo-mechanism, and electronic process control equipment is exhibited by **Evershed and Vignoles, Ltd.**

The instrument section comprises a complete range of 'Megger' insulation and continuity testers, earth testers, and bridge testers; 'Dionic' steam and water purity testing equipment, and a range of polarographs for chemical analysis.

The instrumentation and control section includes process control equipment based on the Evershed electronic repeater system of measurement and control for nuclear, petroleum chemical, boiler and iron and steel plant. Seen here are simple analogue computers requiring no programming, yet capable of performing addition, subtraction, multiplication, division, squaring and square root extraction.

The new Evershed MK.IV all-electronic process controller providing non-interacting control terms, a wide range of proportional, integral and derivative adjustments and the facilities for the inclusion of measuring and recording instruments for statistical and accountancy purposes are also on show; and a range of electro-hydraulic and electro-pneumatic valve and damper positioners.

The **English Electric Co., Ltd.,** has a representative selection of products incorporating their latest developments. Among these is a comprehensive range of electrical measuring instruments including 'miniature' and 240° scale ranges.

The Company's controls and electronics division has a working demonstration of electrical control gear for use in steel rolling mills.

Pneumatic Gear also Seen

The Accurate Recording Instrument Company have a wide range of industrial instruments. These include pressure gauges, temperature indicators and recorders, tank contents gauges, indicating thermostats, and remote electrical tele-recording instruments.

The Company is also showing its pneumatic operated gear.

The General Electric Co., Ltd., feature their semi-conductor devices by a demonstration of germanium and silicon diodes, power rectifiers, and transistors.

The use of photocells in automatic control systems, is also shown, as well as accelerometer and vibration strain equipment, demonstrated in operation on a steel bar.

Associates of the Company, the **M.O. Valve Co.** and **Salford Electrical Instruments, Ltd.,** also exhibit their products on this stand.

Cinema Television, Ltd., display a comprehensive range of electronic equipment and vacuum devices, including many new transistorised instruments.

These include automatic voltage regulators, industrial electronic metal detectors, and radio-sonde telemetering equipment, as well as much other new equipment.

The **British Thomson-Houston Co., Ltd.,** exhibit includes a gas leak detector capable of detecting gas leakage rates down to .02 oz. per year!

Induction Heater

Other of this Company's exhibits include a high frequency heater, showing the latest techniques in modern heat treatment processes, electronic motor control for stepless variable speed control and constant torque at any load, and a wide range of other industrial equipment.

Among the exhibits on the **Ether, Ltd.,** stand is a new and comprehensive range of solenoid valves for controlling all media. There is also a new potentiometric recorder and controller for multi-point recording, and single-term or two-term control.

Numerous other exhibits include surface contact temperature indicators, molten metal pyrometers, portable instruments, and radiation units.

Elcontrol, Ltd., have an interesting display of flame failure and ignition programming control units for use with all types of gas-burning equipment. They make use of both photo-electric scanning heads and infra-red sensitive heads.

Other exhibits include liquids and solids level control gear. Examples of complete process control panels are shown.

The **Metropolitan-Vickers Electrical Co., Ltd.,** exhibit includes an analogue computer, a high-speed data transmission system, and a flame-proof photo-electric unit.

Among other items there is also a

Sir Harold Smith, Chairman of the Gas Council, left, is seen with Sir Henry Self, Chairman of the Electricity Council, who was principal speaker at the opening lunch of the Exhibition.

vapour phase chromatograph for the analysis of gases and volatile liquids.

The **British Ermelo Corporation** show high-pressure flexible hose and replaceable end fittings suitable for pressures from 1,000 to 4,000 p.s.i., and for use on hydraulic systems, steam, gases, chemicals in solution, etc.

The Company also shows examples of high pressure safety couplings in steel, brass, and aluminium.

Alexander Controls, Ltd., show a complete range of packless solenoid operated valves sold under the trade mark of 'Alcon.' The valves cover sizes from ¼ in. to 8 in. bore for use on gas, air, steam, water, oil and almost every known liquid and gas.

Bailey Meters & Controls, Ltd., exhibit their capacitance relay, console desk, draught gauges, electronic calortron recorders, electro-pneumatic converter, and various instrument panels. Smoke density recording and indicating equipment including indication beyond set point, is also shown, and also transistorised controller and alarm applications are demonstrated.

The Drayton Regulator and Instrument Co., Ltd., show Hydroflex metal bellows for temperature and pressure sensitive systems, vacuum seals, expansion joints, flexible couplings, etc.; while the **Foster Instrument Co., Ltd.,** are displaying temperature measuring and controlling instruments, smoke density detecting equipment, introscopes, for the internal inspection of bores, tubes and hollow parts of various shapes and dimensions, and periscopes for furnace viewing.

The Mine Safety Appliances Co., Ltd., show instruments for the detection of methane, petroleum and other hydrocarbons and for hydrogen. These are portable or permanently installed; ranging from the well-known M.S.A. explosimeter to the combustible gas alarm system and including the new M.S.A. methane tester.

The **Morgan Crucible Co., Ltd.,** show their 'Morganite,' 'Sinterlink,' and 'Reservoil' products, while **Nash and Thompson, Ltd.,** show their instruments for the gas industry, corrosion engineering, and medical research.

NEWS FROM NORTHERN IRELAND

Newry Gas Committee Urges Bog Ore Industry in Ulster

NEWRY (CO. DOWN) GAS COMMITTEE has decided to write to the Northern Ireland Ministry of Commerce urging an investigation into the possibility of developing a bog ore industry in Northern Ireland.

Mr. J. Collins (Manager) said it was strange that in many parts of Ireland where good quality bog ore existed, they had to import it from Denmark. Lack of demand for Irish bog ore had caused many of the small industries to close down.

Mr. B. McShane said the Government should subsidise the industry so that it could compete with Denmark for the Irish and English markets.

Mr. Collins said Irish bog ore cost 82s. 6d. per ton delivered at Newry railway station, but the cost of taking it from the station to the gasworks, a distance of a mile, was 8s. 9d. a ton, not including handling charges. Danish bog ore cost 98s. per ton delivered at the works.

The credit balance in favour of the Newry undertaking at the end of the year was £2,944, a drop of £2,625 compared with the previous year, it was reported at the Urban Council Gas Committee meeting.

Mr. Collins said the undertaking had gone through the whole year without any increase in the price of gas, despite a 10s. a ton increase in the price of coal. There was also a deterioration in the quality of the coal.

A credit balance had been used up to offset the increased cost of gas production. In view of the fact that four years ago the undertaking had a £6,000 overdraft the present position was very satisfactory.

Coleraine (Co. Londonderry) Borough Council were informed recently that the amount of gas manufactured at the Council's gas undertaking from February 21 to March 28 was 16,272,000 cu.ft., an increase of 988,900 cu.ft., compared with the corresponding period last year.

Total gas made from April 1, 1957, to March 28 this year was 161,191,000 cu.ft. compared with 168,078,000 cu.ft. during the corresponding period last year.

Coke sold to date this year totalled 2,095 tons, compared with 1,593 in the corresponding period last year.

Replying to a member, the Gas Manager (Mr. T. R. Cameron) stated that the amount of gas supplied from the Council's undertaking to Portstewart had increased slightly. Over the Easter holidays the increase was about 10%.

Company Moves

Gilmoor Control Systems Ltd., well-known as manufacturers of supervisory controls and telemetering systems, has moved from Watford to the main building of Electroflo Meters Co., Ltd. (Member of Elliott-Automation Ltd.), Abbey Road, Park Royal, N.W.10. The Electroflo Company has acquired the whole of the share capital of Gilmoor Control Systems Ltd.

Argentine Signs Agreement with Primitiva

AN agreement was signed on April 2 following on the announcement last November by the Board of Primitiva Holdings, Ltd., that a decree had been issued by the Argentine Government authorising the subsidiary Companies, the Primitiva Gas Company of Buenos Aires, Ltd., and the Province of Buenos Aires Gas Co., Ltd., to settle their long outstanding claims.

The agreement follows the lines expected. The Argentine Government will pay £2,060,950 sterling, of which £206,950 is payable in cash and the remainder in bills falling due over 4½ years, without interest, in payment of the expropriated properties of both the Primitiva and the Province of Buenos Aires Companies.

Costs Not Fixed

This figure has been arrived at on the basis that the claim of the Municipality of Buenos Aires against the Primitiva Company will be settled by the Argentine Government after the municipality of Buenos Aires have taken over the Company's monies amounting to $14,211,868.60, already embargoed, in addition to $2,992,997.03 previously collected by the Municipality. Each side is to pay its own costs in the expropriation law suit, the amount of which has not yet been fixed.

The Board are still unable to add to what they said in their previous communication to the effect that various outstanding questions involving considerable sums of money will have to be settled before break-up figures can be estimated with any accuracy.

Scientists Share Information on Use of Coal

A RESIDENTIAL conference, convened by the Institute of Fuel, and entitled, 'Science in the Use of Coal,' has just been concluded at the University of Sheffield. This three-day conference, brought together many of Britain's top scientists and fuel technologists to discuss the results of their efforts in the scientific investigation of coal and its utilisation.

Over 40 papers were presented, many of them introducing original research work. The subjects covered were: physics and chemistry of coal; coal preparation and breakage; coal carbonisation; combustion and gasification; and reactivity of cokes and chars.

Among the organisations represented at the conference were the Institute of Fuel, the universities, the nationalised coal, gas, and electricity industries, the British Coal Utilisation Research Association, and the Fuel Research Station.

The Airborne Sealing Process of Retort Maintenance

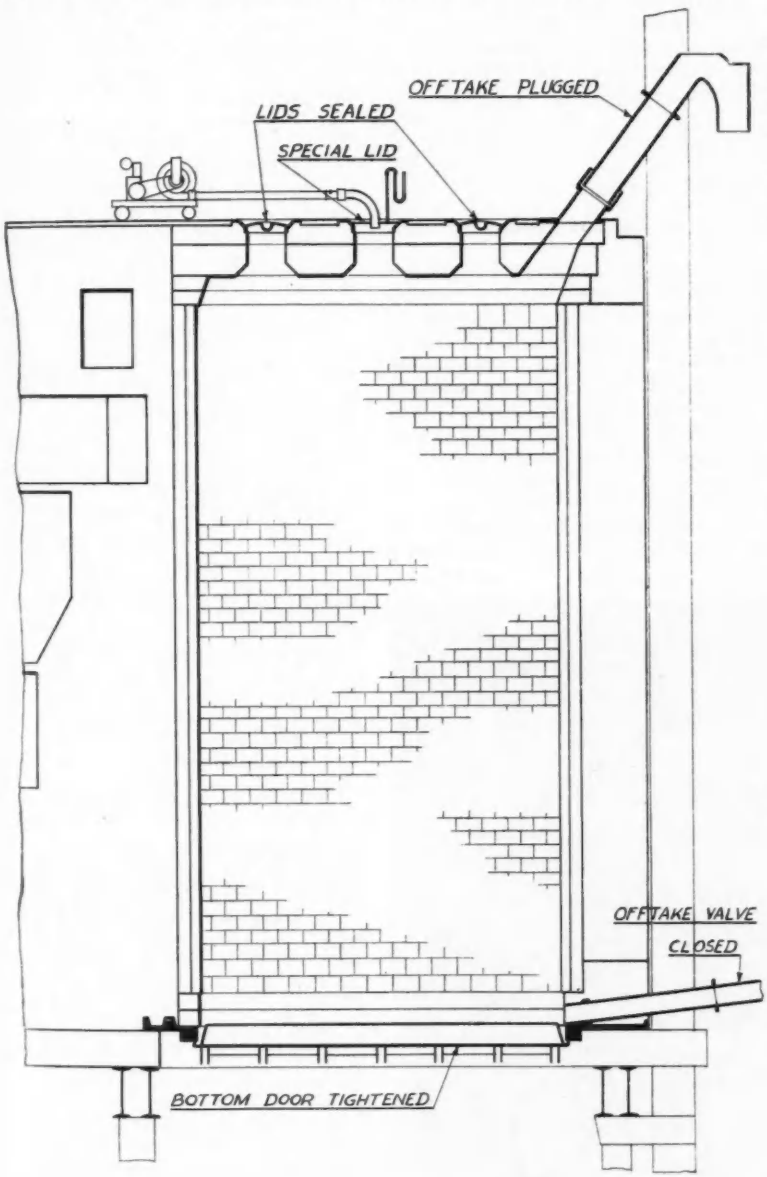
By A. G. BIRD, *M.I.Mech.E., M.Inst.Gas E.*

IN the paper presented by the writer in 1946 to the London and Southern Section of the Institution of Gas Engineers, the principal methods used in retort maintenance, such as hot and cold patching, spraying and welding, were set out. Most of these are directed to the repair of damage which has already occurred, whereas the object of airborne sealing is mainly preventive and directed to the maintenance of gas tightness throughout the retort life.

If the incipient leaks, which are inherent in the joints of retorts constructed of the modern refractory materials, are allowed to continue unchecked, there may be premature development of more definite leaks, requiring more difficult repairs and consequent loss of carbonising time.

Furthermore, during the working life of the bench, stresses are set up which, together with the natural growth of the setting refractories, produce movements in the retort wall. Sometimes the strength of the refractory piece is less than that of a joint that has slagged, in which case the refractories themselves may crack. But more serious are the disturbances set up when the settings are let down during period of low load or for incidental repairs, when the whole structure contracts and the monolith of the retort may be disturbed. It is the usual practice to take the opportunity, while retorts are cold, to point up all loose joints. Thermal expansion of the new pointing material may cause additional stress and movement when the settings are heated up.

Two methods of securing gas-tightness suggest themselves: (a) To form a glaze on the surface, and (b) to reduce the porosity of the refractory brick and joints to a negligible value. The glazing of some portions of the retort surface takes place naturally. Fluxes present in the coal react with the complex of the refractory material to form compounds of comparatively low melting-point. But it is impossible to control the glazing of the whole surface of the retort, particularly a vertical retort, in this manner, and uncontrolled surface fusion may lead to complete breakdown.



Sectional view of a vertical chamber showing how the top and bottom offtakes must be isolated from the foul main, the lids sealed and the bottom door tightened while the airborne sealing is in operation.

The Solution

Graphite acts as a sealing agent, but scurf—as it is known in connection with gasworks practice—is not formed over the full length of the vertical retort. Attempts have been made to force rich gases into the open joints or cracks with the object of filling them with carbon, by working at a higher than normal pressure within the retort after scurfing, but this method is not to be recommended in view of the established fact that such penetrations in many cases have a detrimental effect upon the life of the retort.

The possibility of depositing in the smallest crack and crevice of the retort wall minute particles of a suitable

refractory has been in the minds of carbonising engineers for many years. There were, however, two major problems which prevented the development of the process.

(1) Design of cheap and convenient apparatus to introduce the powder.
(2) Production of a refractory powder pulverised to a sufficient degree of fineness to enter the small cracks and fissures and of a nature to adhere to the retort structure without causing any deterioration of the surfaces.

Airborne Sealing Process

After considerable experimental work during 1944 and 1945 this process was introduced to the gas industry by the writer in 1946 in the paper referred to and at once created considerable interest. It has continually increased in popularity so that during the past year some 250,000 lb. of processed powder has been supplied to over 130 works in the United Kingdom and 30,000 lb. to works abroad in Scandinavia, Holland, France, South Africa and Australasia. In addition several works operate the process using non-standard powders, and others have their own basic jointing specially processed by the manufacturers.

While the process was primarily evolved for use in continuous vertical retorts, in many works it is in regular and successful operation in intermittent vertical chambers, coke ovens and horizontal retorts. In older retorts the process is applied in conjunction with other methods of hot repairs, such as flame welding and hot patching.

The airborne system of retort maintenance is used by all the area boards in Great Britain. It is now specified that all Glover-West C.V. retorts are sealed before being put into operation and most of them are treated regularly after scurfing, but the routine use of airborne sealing is by no means confined to this system.

The machine which has been developed to introduce the powder is too well-known to need a detailed description. Essentially it consists of a small fan which can be electrically or petrol driven. The whole unit is mounted on a light trolley so that it is easily portable. The fan is capable of maintaining a pressure inside the retort, so that when the powder is introduced into the air stream, the particles are carried into any crevices in the retort walls.

Standard Powders

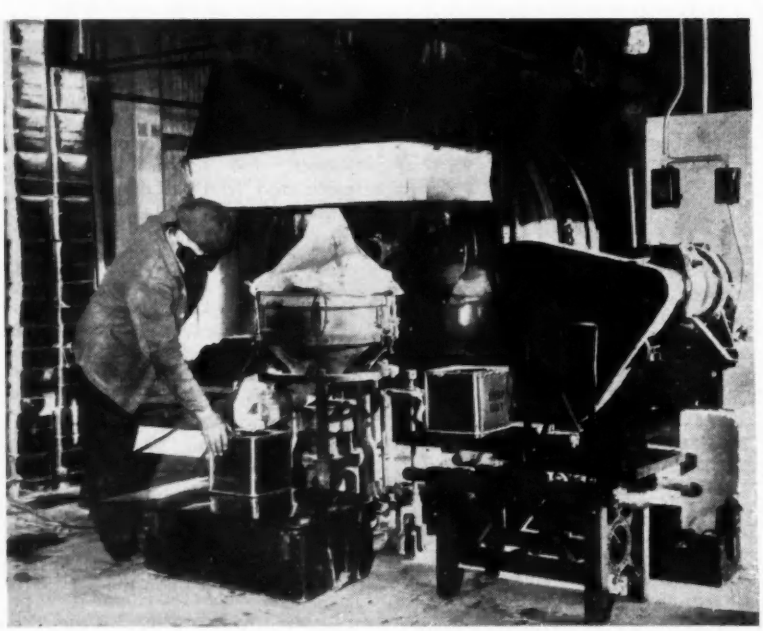
Accumulated experience in the use of the process since its introduction in 1946, both in the use of powders of several different compositions and in experiments on old as well as new retorts, has resulted in the evolution of a series of standard powders, which are now available. These can be used with confidence in the specified conditions which cover the several types of carbonising vessels now in use.

As the powders are made up from a silica flour with admixed 'fluxes,' it is essential that the grain size of the particles shall be consistent in order to avoid segregation of the component materials by elutriation in the retort. Experiments with different gradings of the powder have proved that thorough pulverising and screening of the materials are essential for successful sealing. This not only ensures perfect mixing but prevents waste, as any particles which are too heavy to be properly airborne will fall away from the air stream and not reach the point where the seal is required.

The use of silica flour without any admixed 'fluxes' may eliminate segregation. It has been demonstrated, however, that the seal formed by the airborne process is developed as a 'diaphragm.' It is, however, this diaphragm that gives the seal, and some 'flux' is necessary for its formation. Where there is insufficient flux, then the residual silica grains do not seal so effectively and larger quantities of material must be used before any seal is obtained at all. Conversely, excess flux results in the formation of a seal very quickly but it is comparatively weak.

The extensive tests which have been carried out, both on working retorts and in the laboratory, have determined the most suitable mixtures, and have proved the process to have no deleterious effect on the retort surfaces, always provided the appropriate standard powders are used.

The plant now installed for the manufacture of the powder has been especially designed to ensure regularity of grain size and to control to fine limits the proportions of the ingredients, particularly the very small proportion of admixed flux. The powder is packed in airtight tins containing 28 lb. suitably labelled and with each tin an instruction sheet is included.

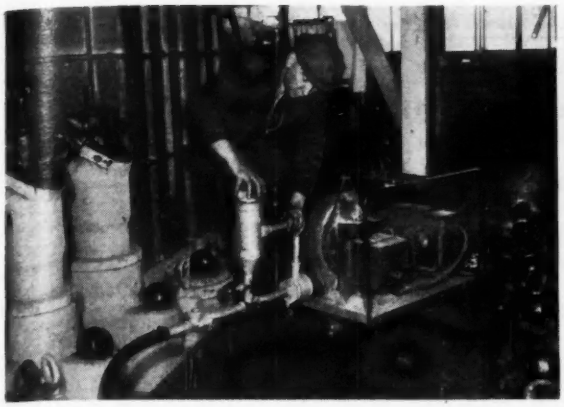


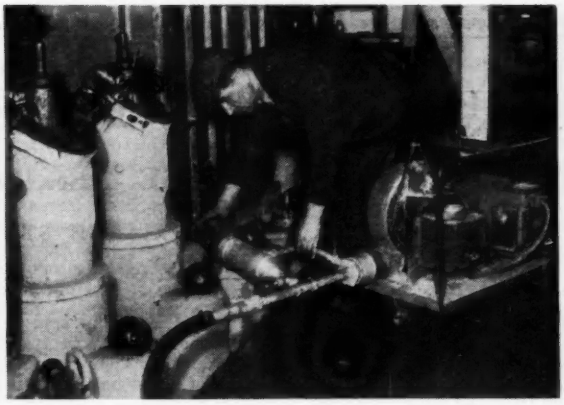
Filling tins of airborne sealing powder. Operator wears a mask to prevent him breathing in the fine silica dust.

Operation

In putting the process into operation it should be remembered that its object is prevention rather than cure, and that it is not possible, nor is it expected, that any but very small holes and cracks will be effectively sealed by this method. The best results therefore will be obtained in the first two or three years of retort life by postponing the day when hot or cold repairs become necessary. Even then, after flame welding or spraying, the process is valuable in completing the sealing of the retort.

It is now evident that the most satisfactory results are obtained in those installations where the process is applied regularly with care and intelligence by the staff entrusted with, and responsible for, retort maintenance. For example, the temperature





Left: *Screwing the cap on to the container into which the sealed tin filled with powder is placed. The portable motor and fan with the starting gear, together with the flexible connection to the retort, can also be seen.* **Right:** *Container shown on its side from which the empty tin is being taken. This arrangement supersedes the old method of hand-feeding the powder into the fan blower itself. The orifice for so doing can be seen just behind the motor starter.*

of the retort wall must be maintained so that the powder will adhere where it is deposited. This entails the use of a minimum amount of air and a steady feed of the powder in small increments to the stream. High pressures are not necessary or desirable. It is essential that the retort fittings should be tight and that the process should be supervised by qualified staff.

It is realised that a totally enclosed powder feed would be a great advantage and development work is well advanced to this end. Not only will this entirely avoid introducing silica powder into the atmosphere, but once the machine is charged and the fan started, no further attention is required.

One form of this arrangement is shown in the illustration. The powder is supplied in sealed tins specially designed to fit the barrel of the machine; into which it is placed after removing the lid. The cap is replaced on the barrel and on starting the fan, the powder is automatically fed to the air stream, until the tin is empty. This design will deliver 4 lb. of powder in 20/25 minutes at a pressure of 1½ in. to 2 in. W.G.

In most works where the process is in operation the retorts are sealed before being put to work, when the walls have reached carbonizing temperatures, and subsequently after each scurfing. Blowing is continued until a definite pressure (of the order of 2 in. W.G.) begins to build up in the retort. The amount of powder used depends on the size of the retort or chamber and the condition of the walls. Good sealing can generally be obtained using 4 to 10 lb. of powder.

Results

While the value of the airborne sealing process is difficult to assess in terms of cash saved on maintenance, it undoubtedly results in stopping incipient leaks from developing into holes in the earlier periods of retort life and therefore therms must have been saved. The cost is so low as to be negligible, having been put at 0.01d. per therm on some works.

In the paper presented by Dr. Haffner to the 6th International Gas Conference at New York in 1955 the author refers to the extensive use of the Airborne Sealing Process in Great Britain and its easy application without serious loss of carbonizing time. Dr. Haffner also stated that 'the method is capable of visibly sealing small leaks' and refers to his 'experience of effectively sealing numerous small leaks in a new setting which had been disturbed by bomb explosions.'

References to the process have also been made in recent technical papers.

Mr. Yeaman in his paper to the Western Junior Association in November, 1957, describes the process as used on continuous vertical retorts at Bristol while Mr. Heeley in his paper on 'maintenance of Intermittent Vertical Chamber Brickwork' at Croydon read to the London and Southern Junior Association on January 3, 1958, explained its use on intermittent chambers and describes it as being 'of great benefit to the chamber brickwork and jointing.'

In view of the arduous nature of the work involved in repairing holes in hot retorts by the usual methods and the difficulty under modern conditions of obtaining labour for such operations, no opportunity should be lost in attempting to reduce their necessity or at any rate their frequency. The airborne sealing process involves no such arduous toil and properly applied undoubtedly has established itself as a useful tool in the maintenance of carbonising retorts and chambers.

APPLIANCE SALES RECOVERY

FIGURES issued by the gas industry for the nine-month period from April 1 to December 31, 1957, confirm the trends shown earlier in the year of a recovery in gas cooker sales, and in sales of wash boilers, washing machines, and refrigerators. Refrigerators especially, with an increase of about 60% have recovered from the low levels resulting from the increased hire-purchase restrictions and the high level of purchase tax.

Gas sales to industry continue to increase, the advance over the previous nine-month period being 3½%, although, partly owing to higher temperatures, total sales showed a slight reduction. There has been a reduction of over 1¼ mill. tons in the quantity of coal carbonised, but increased production of water gas and an increase in gas purchased from coke ovens has almost entirely offset the fall in the make of coal gas.

Small increases in total sales of gas in the quarters ending September and December, 1957, were not sufficient to offset the fall recorded in the June quarter. For the nine months ended December, 1957, sales were 1% lower than in the same period of 1956.

While industrial sales have shown a useful recovery, up over 5% in both the September and December quarters, domestic and other sales have remained below the sales of the previous year.

The net make of coke was 7% (over 600,000 tons) lower in the nine month period and the output of both tar and benzole was also restricted.

The slight recovery in cooker sales experienced in the six months previous continued in the December quarter when sales increased by 6%. For the nine months sales have increased by 3.6%. There have also been increased sales of wash boilers and washing machines (plus 3%) and refrigerators (plus 58%), but sales of gas space heaters have fallen by 11% and of water heaters by 7%.

From a paper to the London and Southern Section, I.G.E., April 15.

The Production of Domestic Solid Smokeless Fuels

By A. C. MONKHOUSE, B.Sc., Ph.D., F.R.I.C.

DEPUTY-DIRECTOR, FUEL RESEARCH STATION, GREENWICH.

It has been estimated that half the smoke in the air comes from domestic chimneys, and these chimneys discharge at a low level. The amount of coal used in domestic appliances in Great Britain in 1956 was 37 mill. tons, or about one-sixth of the total coal used. This coal is mainly bituminous coal, with a volatile matter of 35% to 45%. It is difficult in the normal domestic appliance to burn these types of coal without smoke emission due to the low rate of burning and consequent low temperature, and the small and variable natural draught available. Smoke can be reduced, and a higher heat efficiency be obtained, by burning solid fuels whose volatile matter is low. These are anthracites, steam coals, and coals from which the volatile matter has been reduced by carbonisation, such as coke. The Committee on Air Pollution estimated that some 19 mill. tons of bituminous coals are being used in the 'black' or heavily polluted areas, so that a considerable effort is required from industry to produce the smokeless fuels required, whether solid, liquid or gaseous. It is not only necessary that they should be smokeless, but also that they should provide at least as good a service as the coal previously used, and at a reasonable price. Can this be achieved? It is not my purpose to consider the whole gamut of smokeless fuels, but to limit my remarks to those solid smokeless fuels produced from bituminous coal by carbonisation, and most suitable for the domestic open fire.

There has been no official definition of a solid smokeless fuel, but the Committee on Air Pollution[1] suggested that the fuels used in a smoke control area could be 'bituminous coals containing not more than 20% of volatile matter (and in consequence substantially smokeless), or manufactured fuels having similar smokeless qualities.' Volatile matter refers to the constituents evolved from the fuel when heated to 925°C. under standard conditions, and consists of moisture, tarry matter, and gases. Although the volatile matter of a coal may give some indication of the smoke-forming constituents, it cannot be an absolute value. Experiments have been made[2] using a conventional type of improved grate with the air control fully open, and measuring the smoke emission with coals of differing volatile matter. For each fuel twelve measurements were made, using the optical density of the smoke and the flow rate of the gases as a measure of the quantity of smoke emitted. The conclusion can be drawn that with coals up to about 12% volatile matter, smoke emission is negligible. Above that figure the curve rises steeply. In the range of normal domestic coals (32% to 40% volatile matter) the variation between test and test is nearly as great as that between different types of coal. In general, caking coals yield more smoke than non-caking coals of the same volatile content, and show a greater variability from test to test.

Within the Limits

A truer measure of the smoke-forming properties of a coal might be the tar evolved as determined by distillation of a coal to 600°C. Most smokeless fuels prepared from coals by carbonisation will come well within the limits proposed by the Committee on Air Pollution.

It is customary to divide carbonisation processes into two groups—high temperature carbonisation (above 900°C.) and low temperature carbonisation (450°-800°C.). Where gas production has been the main consideration and coke production has been secondary, high temperatures of carbonisation have been used. Where reactive coke has been the primary product, low temperatures have been used.

The gas industry, in its early days at the beginning of the 19th century, started with a low-temperature carbonisation process. Metal retorts were used and the product must have been a very reactive coke. Soon the material of the retorts was changed to fireclay, and by 1880 this was common practice. High temperatures of carbonisation were used, and the cokes then made would be equivalent to those made at temperatures of 700°-800°C. today. With the development of the use of silica materials for retorts, the temperature of carbonisation attained was not less than 1,000°C., and the majority of cokes produced today are made at about this temperature. At the present time some 3¾ mill. tons of coke are used for domestic purposes, of which about 90% is high-temperature coke. There is little difficulty in burning high-temperature cokes in closed appliances provided the coke is sized, and the appliance is of adequate size. Also, with the modern coke-burning grate for the open fire they are usually satisfactory, but a rather more reactive fuel would give more satisfaction because of the ease of 'pick-up' or recovery of the fire after refuelling, and also might avoid the need of a replacement fire. The ignitability of a coke and its combustibility are influenced by the type of coal from which it is made, the temperature of carbonisation, and the system used, which involves time of carbonisation and whether steaming of the charge occurs or not.

Continuous Steaming

In normal practice carbonisation in horizontal retorts or coke ovens is without steaming; in chamber ovens steaming occurs towards the end of the carbonisation period, and in continuous vertical retorts steaming is continuous. In horizontal retorts, chamber ovens and coke ovens, the preliminary products of distillation pass through red hot coke and are subject to higher temperatures than with continuous vertical retorts. These secondary reactions, involving the cracking of the distillation products, may cause deposition of carbon on the coke particles and influence their combustion characteristics. As a rough approximation, the order of increasing combustibility of the coke by systems, is coke ovens, chamber ovens, horizontal retorts, continuous vertical retorts. Using existing systems of high temperature carbonisation, and either modifying slightly the temperature of carbonisation or using lower rank coals (700 to 900), cokes of a more reactive type have been produced.

Jamieson and King[3] in a series of experiments undertaken at the Edinburgh Corporation gasworks in collaboration with the Fuel Research Station, showed that using a continuous vertical retort it was possible to carbonise sized weakly-caking coals from Scotland, Northumberland and the Midlands to yield a combustible coke having a volatile matter of about 4%. The combustion chamber temperatures were reduced from 1,350°-1,100°C. to 1,200°-950°C., but the throughput of the coal was maintained. Some coke is still being produced of this type.

The City of Birmingham Gas Department from 1930 to 1939[4] undertook work on the production of a readily ignitable coke using standard gas-making equipment. Their experience was that using horizontal retorts, lower temperatures of carbonisation, and activation by additions of sodium carbonate and lime were not economic. The most promising method was to carbonise Midland coals, particularly from the Nottinghamshire coalfield, in continuous vertical retorts with combustion chamber temperatures of 1,350°C. at the top and 1,080°C. at the bottom. Steaming of the charge amounted to 15% by weight of the coal carbonised.

At Liverpool gasworks[5] a reactive coke was produced in horizontal retorts and later in continuous vertical retorts from selected low rank coals. The coke was dry quenched. The product was sold under the name Dryco and had a ready sale. Its production was given up during the war

and has not been re-started. The other method of producing a solid smokeless fuel is by carbonising coal at a lower temperature. This type of coke is suitable for any type of appliance and can be considered as a direct substitute for coal.

The disadvantages of low temperature carbonisation are that at these temperatures the throughput is low due to the low thermal conductivity of the coal, the thermal yield of gas is approximately only one-half that obtained at high temperatures, and the resulting coke is more friable, contains a high proportion of small size, and has a much lower bulk density. Numerable schemes of low temperature carbonisation have been described in the literature, but only a small proportion reached the commercial scale. In the period 1920-1939 those processes, amounting to 15, which had been developed to the commercial scale in the United Kingdom were tested by the Fuel Research organisation of D.S.I.R., and reports were published through H.M. Stationery Office.

They can be classified as follows[6]:—

External Heating

1. Static charge: Thin layers in metal retorts, *e.g.*, Coalite; Hird; Illingworth.

2. Moving charge: Metal or brick retorts gravity operated, *e.g.*, Fuel Research Station; Crozier.

Metal or brick retorts: charge mechanically moved, *e.g.*, Freeman, Fusion.

Internal Heating

1. By sensible heat of burned gases, *e.g.*, British Coal Distillation; Babcock & Wilcox; National Carbonising Co. Ltd. (Rexco).

2. By combustion of coke, *e.g.*, MacLaurin; Bussey; Midland Coal Products.

3. By superheated steam, *e.g.*, Turner.

Other processes have been operated using mixtures of coal and oil, either in rotary retorts or static charges, such as the Swallow, and those of the National Coke and Oil Company and Coal and Allied Industries. The main claim of these processes was that higher yields of liquid products could be obtained from coal than when carbonised alone. Of the various low temperature processes in existence before 1939, only the Coalite process and the Rexco process are in operation today. Since World War II progress in the production of solid smokeless fuels has been made in this country in various directions. I would like to review the recent work, dealing in more detail with the work of the Fuel Research Station.

Consideration was first given to the possibility of using existing gas-making plant and standard gas coal to make an improved domestic coke by modification of carbonising conditions.[7] There were available for the work two Woodall-Duckham intermittent vertical chambers, each of capacity of 2½ tons of coal. South Yorkshire gas coal of 1¼ in. to ⅝ in. size was used for the experiments. The normal conditions of operation of this plant is a temperature of 1,350°C. in the bottom flues, and 950°C. in the top, a carbonisation time of 12 hours, and a period of steaming to the extent of 5% of the coal as charged during the last two hours of carbonisation. For the experiments the temperatures were reduced in stages to 1,150°C. in the bottom and 850°C. in the top flues, and the period of carbonisation to nine hours, which was the limiting period to avoid sticking of the charge. The general conclusions reached were that although the combustibility of the coke could be increased, the improvement was only made at the expense of a serious reduction of about 25% in the thermal yield of gas, although the thermal output per unit of plant was maintained or even increased.

The next series of experiments was to use the same carbonising plant, but to carbonise weakly-caking coals in place of the normal gas coals. For this purpose sized coal was used and care taken to avoid coals whose cokes on wetting 'spit' or 'explode' violently in use, shooting pieces of coke across the room. This property is sometimes associated with the shale in the coal and seems to be avoided in all systems which crush the coal finely before carbonisation, although this has certain disadvantages.

Eight coals were carbonised[8] from the East Midlands Division varying from Type 602 to 902, with a volatile matter of 36 to 41% on a dry ash-free basis, and a moisture content as charged of from 7 to 12%. Combustion temperatures were approximately normal. The yields of coke and gas for four of the coals are given in Table 1. Type 902 (Hucknall) coal proved unsuitable as the breakdown of the coke was too great. The other cokes from coals of Types 802, 702 and 602 gave a total yield of coke (dry) of about 12 cwt. per ton of coal charged. Although every endeavour was made to use coals of nominal size, 3 in. to 2 in. or 2 in. to 1 in., there was a considerable proportion (6-10%) below ¾ in., resulting in a higher proportion of small-sized coke, but taking the yields of coke over ¾ in. there is available about 10 cwt. of coke per ton. Cokes down to ½ in. size have been shown to give satisfactory performance in the open grate. The thermal yields of gas of calorific value of 519 to 554 B.Th.U. per cu.ft. varied from 65 to 73 therms per ton.

The North Thames Gas Board in 1955 decided to undertake experiments on carbonising East Midlands coal to determine the economics of the production of reactive coke under full scale working conditions. After preliminary experiments in the continuous vertical retorts at Bow Common, full scale trials were made at the Kensal Green works and at the Romford works. At both works increased throughputs were obtained, a lower thermal yield per ton, but a slight increase in the output of gas per retort per day. Dr. Burns[9] reported that new carbonising plants specially designed for the treatment of low rank coal would have lower capital costs per ton than plants carbonising traditional gas-making coals, and that the operating costs would be lower due to the ease of coal travel through the retort. The reactive coke is now in commercial production under the name of Cleanglow.

Our attention then turned to low temperature carbonisation. The process depends on satisfactory heat transfer. The Coalite process uses cast iron retorts of about 5 in. diameter, externally heated to about 600°C. a charge of 6-7 cwt., and a

TABLE 1
CARBONISATION OF WEAKLY-CAKING COALS IN INTERMITTENT CHAMBER OVENS

	Hucknall	Moorgreen	Ormonde	Holmewood
Coal				
Name	Hucknall	Moorgreen	Ormonde	Holmewood
Rank	902	802	702	602
Nominal size, in.	2½—1¼	3—2	3—2	2—1
Amount below ¼ in. as charged %	6·6	10·7	5·8	9·8
Moisture as charged %	16·1	9·0	9·8	7·7
Conditions of carbonisation				
Flue temps., °C. top	950	980	980	970
bottom	1240	1290	1300	1280
Period, hours	10	11	10	11
Throughput, tons per retort per day	5·0	4·6	5·0	4·5
Coke				
Total cwt./ton	11·0	12·1	11·9	12·3
Over ¾ in. cwt./ton	6·0	10·3	9·8	9·9
¾—¼ in. cwt./ ton	2·0	1·1	0·9	1·4
Breeze below ¼ in. cwt./ton	3·0	0·7	1·2	1·0
Volatile matter (lump coke) dry %	2·8	1·7	2·0	1·3
Gas				
Volume cu. ft. per ton	11,070	12,750	11,740	14,040
Calorific value (gross) B.Th.U. per cu.ft.	524	549	554	519
Therms per ton	58·0	70·0	65·0	72·8
Therms per retort per day	292	321	328	326
Sp. Gr. (air=1)	0·499	0·458	0·461	0·430

TABLE II

CARBONISATION OF WEAKLY-CAKING COALS IN CONTINUOUS NARROW VERTICAL RETORTS

	Ormonde	Holmewood	Gedling
Coal			
Name	702	602	80[illegible]
Rank	3—2	2—1	2½—2
Nominal size, in.	13·8	9·0	15·5
Amount below ¼ in. as charge %	7·1	9·0	15·5
Moisture as charged			
Conditions of carbonisation			
Flue temps. °C. top	1150	1055	1135
bottom	1020	850	940
Throughput, tons per retort per day	10·1	7·5	9·9
Coke			
Total cwt./ton	13·5	12·6	12·0
Over ¾ in. cwt./ton	9·6	10·8	9·5
¾—¼ in. cwt./ton	2·3	1·1	1·2
Breeze below ¼ in. cwt./ton	1·6	0·7	1·3
Volatile matter, dry %	6·6	4·3	7·7
Gas			
Volume, cu. ft. per ton	8,625	8,000	6,030
Calorific value (gross) B.Th.U. per cu. ft.	541	591	554
Therms per ton	46·7	47·3	33·4
Therms per retort per day	472	355	331
Specific gravity (air=1)	0·572	0·508	0·573

time of carbonisation of four hours. The Rexco process uses internal heating by circulating hot combustion gases through the charge. Each retort takes a charge of 34 tons, which is heated to 600°-700°C., and a time of carbonisation of six hours.

Each system has disadvantages; a metal retort has a limiting temperature of 650°C. and a correspondingly low throughput, due to the low thermal conductivity of the coal, while internal heating, which has good heat transfer, results in a gas of low calorific value (about 140 B.Th.U. per cu.ft. as against 750 with external heating). Previous work at the Fuel Research Station had shown that some of these disadvantages could be overcome by using a narrow brick retort externally heated due to the higher temperature of carbonisation (about 750°C.) possible with brick retorts, and the high throughput of coal obtainable. Satisfactory domestic fuels were made from a wide range of coals, using a setting of two retorts. In 1935 a setting of six retorts of this design was erected at the Parkgate coke oven plant of the South Yorkshire Chemical Company. Smokeless domestic fuel was produced from strongly caking South Yorkshire nut coal of the same type as that used for the production of metallurgical coke.

The setting at the Fuel Research Station was recommissioned in 1957 and a series of coals examined. It consists of two fire-brick retorts 21 ft. 9 in. high and 6 ft. 6 in. long, and a width tapering from 7 in. at the top to 11 in. at the bottom. The heating flues are arranged as eleven horizontal passes interconnected at alternate ends. The retort walls are built of 9 in. by 6 in. tongued and grooved panel bricks. The retorts are normally operated with maximum temperature at the top flues in order to effect a rapid carbonisation of the coal as it travels through the narrow section of the retort. The 'skin' or initial layer of coke facilitates particularly the travel of the higher swelling coals through the retort. The coal is charged continuously from a charging hopper, and the coke discharged through an extractor into a coke chamber where it is steam quenched.

High Content of Small Coal

A special investigation was made of certain coals in the East Midlands Division of the National Coal Board. Although this system is capable of carbonising caking coals, it was thought that the need was for the conversion of existing household coal to a smokeless fuel. Examples of carbonisation of weakly-caking coals from the East Midlands Division is given in Table II.

With a temperature in the top heating flues of about 1,100°C., and with steaming equivalent to 10% on the weight of coal, the total yield of coke varied from 12 cwt. to 13.5 cwt. depending on the throughput. The breeze content (below ¼ in.) amounted to 1.8-3.9 cwt. per ton. This is partly due to the high content of small coal in the charged coal. The maximum thermal yield was 47 therms per ton. The thermal output per retort per day was from 330-470 therms (a gas calorific value of about 560 B.Th.U. per cu.ft.). The yields of tar were higher and the specific gravity lower than in high temperature carbonisation. A plant of similar design is being installed at the Coal Research Institute, Dhanbad, India, to carbonise local coals of poor or weakly caking properties for the production of a smokeless fuel for domestic purposes and for tar. If trials on the test plant prove satisfactory, a commercial sized plant having a capacity of up to a million tons of coal per annum is projected. Recently, two officers from the Fuel Research Institute, India, received training in the operation of the plant at Greenwich.

Reference should also be made at this stage to a recent low temperature process, developed by the North Western Gas Board at their Partington works, (10), by carbonising East Midlands coal of rank 802 in continuous vertical retorts by injecting water gas (the Rochdale process) during carbonisation. This process combines the advantages of external and internal heating. The coke is sold under the name Phimax and is a direct replacement for bituminous coal in open fireplaces.

It is customary to determine the combustibility of cokes either by its C.A.B. value, which has the disadvantage of being somewhat artificial, or by some simple practical test which gives comparative readings. For combustible coke, those which could make a direct replacement of coal in existing fireplaces, a standard stool-bottom grate has been used. The stool-bottom grate used for the test was fitted in a refractory concrete fireback insulated around its back and sides with slag-wool. The fireback was connected into an 8 in. diameter straight metal flue-pipe which terminated 15 ft. above hearth level. Radiation output was measured over the hemisphere, using five Moll thermopiles in the five-fold Russell angle positions, the arc being placed in the five Russell positions of longitude.

The grate was charged with coke to a datum level of 35° to the horizontal, and gas for ignition of the fuel was supplied until the radiation output had reached 1,500 B.Th.U. per hour. The gas was then turned off and the fire was allowed to burn. It was refuelled twice to the datum level when the radiation output had fallen to three-quarters of its previous peak value. After the third peak value, readings were continued until the radiation output had fallen to 1,500 B.Th.U. per hour. The fire was not poked at any stage. The unburnt coke, shale and ash were weighed separately when the fire had cooled.

[A comparison of the combustibility of various cokes was made in a third table. The greater combustibility of the cokes made from weakly-caking coals at high temperature and from the low temperature process was clearly shown, and the coke was also more completely burned. The cokes from low temperature processes were in general more reactive than those from weakly-caking coals produced under standard high temperature conditions. Both these types of coke will provide a satisfactory fuel to replace household coal in existing open fires.]

Many proposals have been made to provide all the smokeless fuels required for the smoke control areas.[11, 12, 13] They usually consist of deflecting coke from other sources, liberating more coke from coke-consuming ancillary plant at gasworks, and building new carbonising plant. There is also involved

the installation of domestic appliances capable of burning normal coke. To change all the appliances in a smoke-controlled area is a large and expensive undertaking. The cost of replacement of a simple open fire to a coke-burning grate was estimated by the Committee on Air Pollution to be about £5 to £6, but they stated that there would be additional costs for provision of gas connections, and in some cases of renewal of surrounds, overmantels, firebacks or hearths. A tentative figure recently given by one local authority was £15-£20 per fireplace. As well as providing new coke-burning appliances, is there not a case to provide more of the cokes I have described, which are direct replacement of coal in the open fire? These cokes cost about 12s. a cwt. compared with 9s. a cwt. for coal. Assuming 16 cwt. of coke is equivalent in thermal value to 1 ton of coal, and that on average an open fire throughout the year burns two tons of coal:—

Cost per annum of burning 40 cwt. of coal ... £18 0s. 0d.
Cost per annum of burning 32 cwt. of special coke ..... £19 4s. 0d.

The difference, assuming one open fire per household, is £1 4s. per annum. The present production of these reactive cokes is limited, but there is a ready demand.

The cheaper process would be the carbonisation of weakly-caking coals in existing plant at high temperatures, but supplies of suitable coal are limited. Existing processes in this category are those of the North Thames Gas Board who manufacture Cleanglow, and the National Coal Board who carbonise low rank coals in coke ovens. The advantage of low temperature carbonisation is that it enables coals to be used which do not produce reactive coke by carbonisation at high temperatures.

Reviewing the low temperature carbonisation processes which have been considered, Coalite is produced from a small size medium-caking coal, Rexco and Phimax from sized weakly-caking coals, and the F.R.S. process, using narrow brick retorts, is capable of using a wide range of coals from weakly to strongly caking at appropriate throughputs and temperatures.

The existing price differential between coal and smokeless fuels does give opportunities to the carbonising industries. Further work may even indicate how the price differential can be reduced and yet the coke retain its easily combustible properties. At this stage more thought might be given to a substantial increase in the more combustible forms of coke for domestic consumption in existing open fires.

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DISCUSSION

Opening the discussion **Mr. G. H. Fuidge,** S.E.G.B., said that Dr. Monkhouse's paper was very timely. There were a large number of people who did not yet appreciate the magnitude of the problems involved in making the domestic open fire smokeless, while there were many others who said that the necessary quantities of smokeless fuel were not and could not be made available, and that therefore nothing should be done. Dr. Monkhouse had steered a well-balanced course between these two extremes as a result of his practical experience at the Fuel Research Station of both the production and utilisation of domestic coke.

There were two basically different approaches to the problem of the smokeless open fire. One was to produce smokeless fuel which would burn satisfactorily on the open grate intended for coal, and the other was to provide a special grate which was suitable for smokeless fuels that were available in quantity. The gas industry had worked for many years on the second alternative and had designed and encouraged the development of grates suitable for burning high temperature coke; in fact, the present so-called 'improved open fire' was based on the original coke grate. The first commercial grate, the Metro grate, which had been designed by the South Metropolitan Gas Company and had been on the market in 1928, was suitable for the horizontal coke from Durham coal as then produced by the South Metropolitan Gas Company, but it was to be regretted that the later designs of grate were rather less tolerant of coke quality than the original Metro grate. In the creation of a smoke control area the use of normal gas cokes involved an appreciable capital outlay in the conversion of fireplaces, since some of the oldest types of fireplace were hardly suitable for any kind of smokeless fuel and would need conversion anyway, but several millions of 'all night grates' on which coke could be burnt, had already been installed in peoples' homes. There was clearly, however, a field for specially reactive fuel suitable for the stool bottom grate. The gas industry had endeavoured to contribute to this requirement by the production of such fuels as Cleanglow and Phimax. However, as Dr. Monkhouse himself had stated in his paper, the quantities of the special low rank coals suitable for the production of these reactive cokes in gas retorts had proved to be disappointingly low, so that these cokes were not likely to be available in sufficient quantity to make any real impression on the smoke problem. But, since Dr. Monkhouse had pointed out that by low temperature carbonisation highly reactive cokes could be produced from a much wider range of coals, he advocated the extension of this form of carbonisation. The higher efficiency of utilisaton of these types of fuels would justify an appreciably higher price for them than coal, but Dr. Monkhouse would doubtless agree that the economics of the production of low temperature coke did not perhaps justify the heavy capital outlay necessary for any great extension of this form of carbonisation.

Consistent Material

If the production of low temperature coke should be increased, the use of high temperature coke in domestic appliances should also be greatly extended. Although gas coke did not have a very high reputation with the advocates of clean air, it would be interesting to indicate what work had been and was being done within the gas industry to improve the level and consistency of quality of gas coke. Dr. Monkhouse had mentioned that the order of increasing reactivity of the coke from the various carbonising processes was from coke ovens, chamber ovens, horizontal retorts, and continuous vertical retorts. This order has, of course, been accepted, and many people considered that cokes from all except the vertical retorts was quite unsuitable for domestic purposes. But this was not necessarily so, and the South Eastern Gas Board had found that by increasing somewhat the volatile content as measured by the volatile therm test, a consistent material could be obtained from coke ovens which was at least no less reactive than coke from horizontal retorts. Coke from all these static plants was appreciably improved by a small increase in volatile content, which could be achieved without upsetting the carbonising process as an economic method of gas making. It had been found possible to control all these systems to give coke of a minimum volatile content of three volatile therms per ton. Without any control the volatile content was often as low as one to 1½ therms per ton and at this level the coke was very unreactive. An ignition test on a coke grate, using 14 cu.ft. of gas showed that these cokes of higher volatile content would give the radiation of 5,000 B.Th.U. per hour in less than 45 minutes. Cokes of that level of reactivity should be considered suitable for use in the modern improved open fires, in fact, some .25 mill. tons of such coke had already been used for this purpose.

Since the coke from static plants was not interchangeable with the more reactive coke from the lower rank coals carbonised in continuous vertical retorts, the draft specification which the industry hoped to put forward to the British Standards Institution, would cover two types of coke which had been designated 'L' and 'M' which indicated respectively low bulk density and medium bulk density. A greater level of ignitibility was

clearly required for the 'L' type coke. The gap between the cokes from high rank coals in static plants and those from the lower rank coals in continuous plant did not need to be so great as was generally thought and apart from the control of volatile content, there were other methods by which the reactivity of the static plant coke could be increased. One such method was under active investigation by his Board. Low moisture content, low ash content and consistently close grading were all almost as equally important as reactivity, so everything possible was being done to tighten up the control of these characteristics. Special coke control laboratories had been established by the South Eastern Gas Board or were being built at the larger works, which would be equipped with fireplaces to ensure that fire tests on the coke made for sale could be carried out as a daily routine.

Dr. F. J. Eaton, Watson House, N.T.G.B. said that the theme of the paper was the smokeless age and the part which solid smokeless fuels, particularly cokes, would have to play in implementing the Clean Air Act. The Beaver Report made it quite clear that cokes would be expected to provide the major proportion of fuels to be used in smoke control areas and that it would be up to the gas industry to provide cokes of suitable quality at a reasonable price and in the quantities needed. Today, however, the industry was in a much better position to forecast the clean air developments for the latest information showed that 16 smoke control areas had been completed, and steps had been taken in a further 100 areas of which 57 were definite. In addition, a number of smokeless zones had been established before the Clean Air Act was passed and there were also a number of housing estates where the burning of smokeless fuels was a condition of tenancy. Although it was now five years since the London smog disaster, Local Authorities, the public, and particularly Medical Officers of Health were showing great enthusiasm and activity in their efforts to clean up the air of our cities. In fact, the current spring issue of *Smokeless Air* gave detailed notes of some 46 Smoke Control areas in different parts of the country.

Dr. Monkhouse had implied in his paper that it would have been an advantage if the gas industry were to make more coke from low rank coals because such cokes were more readily combustible and could be more easily burned on traditional coal appliances. Experience with Cleanglow showed that the convenience of its low ash content of about 6% as much as its free burning properties was responsible for its popularity.

Not Worth Expense

Since 1947, all new and reconditioned dwellings had been provided with approved appliances which would give a satisfactory performance on gas coke of open fire quality, as well as on coal and many of the smoke control areas now operating included dwellings already equipped with approved open fires. Elsewhere, some property might be scheduled for demolition, so it was obviously not worth the expense to instal new appliances and here a premium coke made from low rank coal could be used. There was thus a need for both premium and open fire cokes. Experience showed that, to make a smoke control area a success, a thorough education of the tenants in the use of coke and the appliance was essential; it was also essential to provide a coke of consistent quality, preferably to the Gas Council 1951 standard and with an ash content not exceeding 10%. The liaison arrangements between Local Authorities and fuel producers had worked well and in all smoke control areas the gas boards had guaranteed supplies.

The present position was, therefore, that cokes of premium quality were an advantage but were not essential to the success of smoke control areas. All householders were not prepared to pay the necessarily higher price of the premium cokes, but for the future, when greater tonnages would be needed, it would be an advantage to increase the availability of premium cokes. This meant an increased allocation of low rank coals. In 1955 this allocation had amounted to about 16% of the total coal requirements although, for some reason, in 1948 the figure had been 24%!

He went on: 'I have been most interested in the account Dr. Monkhouse has given of the Fuel Research Station experiments in the carbonisation of low rank coals. Experience shows that coals of rank 700 to 900 give reactive cokes but the reason for this is not given. Could Dr. Monkhouse advance any theories? Is it due to the more rapid heat penetration as compared with high rank coals? In the production of Cleanglow it has been our experience that throughput has a relatively greater influence on combustibility than carbonising temperature. In one Cleanglow experiment, a drop in throughput from 6.5 to 5.85 tons per retort per day increased the time taken to give a bright fire in our standard test from 30 to 40 minutes. The latter coke would be unacceptable as a premium coke. Has Dr. Monkhouse found it practicable to predict from the coal rank its suitability for making a premium coke? From our experience in making Cleanglow from 15 different coals, there are other properties not covered by the coal rank classification which make it necessary to determine the suitability of a coal by full scale carbonisation trials.'

Mr. Frank Evans, Coke Manager, S.E.G.B. said that Dr. Monkhouse had stressed in his penultimate paragraph that more thought might be given with advantage to a substantial increase in the more combustible forms of coke for domestic consumption in existing open fires. This, the gas industry, had always done. Dr. Charles Carpenter had decided 30 years ago that the South Metropolitan Gas Company should make a coke grate that would burn any coke that might be produced, or alternatively, a very reactive fuel which would burn on any grate; that policy had been carried out in the 30's. Today, economics were against his board supplying Metro-Coalite, and the coke grates were now called by many different names.

Would Be Halved

At present day prices, high temperature coke bore half the cost of the carbonising process, but if the other low temperature processes suggested by Dr. Monkhouse were adopted, the gas yield would be halved. Since the price of gas could not be increased, coke would have to bear three-quarters of the cost of carbonisation, with an increase in price from the present 10s. per cwt. to 15s. per cwt.

Although the yield of coke would be increased in these low temperature processes, the extra cost would have to be recovered from the open fire size which, even if all the coke had been cut, would not amount to much over 50% of the whole. In certain favourable instances highly reactive cokes might be produced at 12s. per cwt. but this could not be done all over the country. Earlier in the paper Dr. Monkhouse had asked whether there was not a case for the production of more of these reactive cokes. The answer to that question seemed to be that there certainly would be a demand for them in many smoke controlled areas where, because older property had been condemned it would be advantageous to supply reactive smokeless fuels even at a higher cost, which might have to be specially diverted to such areas. It had been put forward that additional production of reactive cokes was necessary to carry out the full plan of smoke control. This did not seem to be so. For an expenditure of between £5 and £25, an ordinary grate could be converted and show a saving in fuel costs to the consumer. Dr. Monkhouse had estimated that a typical consumer used coal worth £18 per annum and that he would use 32 cwt. of smokeless fuel to give a comparable result. Coke at 10s. a cwt. would cost the consumer £16, with a saving of £2 per annum and the capital would be recovered in seven or eight years.

The changeover to special carbonising plants would mean scrapping existing plants and building new ones with double the carbonising capacity to get the necessary gas make. There would be amortisation charges of over £2 per customer per annum, and on Dr. Monkhouse's figures the customer would be spending 24s. per annum more on fuel. It would seem, therefore, that economics were in favour of changing the grate and using high temperature coke. Considerable additional supplies of large low rank coal might not be available and therefore if a worthwhile plan for a smokeless Britain was to be carried through, high temperature coke from high rank coal in the main would have to be used, and it would be a great opportunity for the gas industry to produce by some means, satisfactory coke of this character. Well made, well prepared coke from Yorkshire coal was satisfactory and in static plants much could be done on the lines outlined by Mr. Fuidge.

Replying, **Dr. Monkhouse** commented on the cost of the installation of coke grates, but pointed out that as well as difficulties arising from this expenditure, much depended on the quality of the coke. Low moisture and low ash were essential if the

public were to change over to smokeless fuel with any confidence. In fact he considered coke quality as a *sine qua non* to the success of any smoke control area. The gas industry were, however, very anxious to improve the quality of its coke and he thought improvements would follow automatically, but the industry must remember it was still a two fuel industry. Smokeless zones, however, began in areas where offices and housing estates with modern appliances predominated, so there had really been no difficulties to be faced in the installing of special appliances. The supplies of coke had been assured and the formation of the zone had gone forward with every chance of success. Premium cokes were necessary where new appliances had not been fitted, but were also of great advantage for use in any type of grate because of their quick pick up after refuelling. Rate of pick up and ignitability were important. Ordinary coke was slow and the effect on the room temperature was immediately apparent. A more reactive coke was needed to overcome this.

Dr. Monkhouse pointed out that the reactivity of the coke could be varied somewhat by the control of the rate at which the coal was brought up to the carbonising temperature. A more reactive coke could be made if the temperature of the charge was brought to 500°C. and held there for a predetermined time before raising it to 700°C., than when the charge temperature was raised to 700°C. without holding it at a lower temperature. The N.C.B. classifications for their coals were not enough to ensure a satisfactory reactive coke without careful preliminary testing. Each type of coal used must be given a full scale carbonising test before it could be taken as a satisfactory raw material.

He was of the opinion, in spite of Mr. Evans' doubts about the feasibility of the large scale production of premium fuels, that more of this type of fuel should be made and the demand for it was being maintained. The National Carbonising Company had recently built a new plant and Coalite was still being made, but the premium mentioned of 3s. a cwt. seemed rather high. Those firms making special fuels were presumably making money out of their manufacture, though he admitted that gas production was not part of their business. Where gas production was important difficulties might arise, but premium coke should be made at gasworks and with more latitude cheap gas should be possible. Lower rank coal may not be readily available, but it can be carbonised without extra cost.

PROGRAMME FOR THE 95th ANNUAL GENERAL MEETING OF THE I.G.E.

THE 95th annual general meeting of the Institution of Gas Engineers will be held in London on May 13, 14, 15 and 16 under the presidency of Dr. J. Burns, G.M., Chief Engineer, North Thames Gas Board. The following is the programme of events:

TUESDAY, MAY 13

10 a.m.—Opening of the meeting; welcome to representatives from overseas; adoption of the report and accounts; scrutineers' report of the ballots; presentation of Medals.

10.25 a.m.—Presidential address by Dr. J. Burns.

11.15 a.m. to 12.15 p.m.—Presentation and discussion of 'Materials and Structures,' by S. V. Gardner.

12.45 p.m. for 1 p.m.—President's luncheon in the Savoy Hotel (by invitation).

3 p.m. to 5 p.m.—Presentation and joint discussion of 'The Sulphur Impurity in Town Gas,' by L. J. Clark, B.E.M., and E. Spivey; 'Sulphur and Gas Appliances,' by C. H. Purkiss; 'Actions, Reactions and Side Reactions of Catalytic Sulphur Removal,' by W. Wedgwood.

8 p.m. to 1 a.m.—Reception and dance at Grosvenor House (evening or dinner dress; decorations).

WEDNESDAY, MAY 14

9.45 a.m. for 10.45 a.m.—Presentation and discussion of 'Domestic Marketing: Comment and Conjecture,' by J. A. Buckley.

10.45 a.m. to 11 a.m.—Annual general meeting of contributors to the benevolent fund of the Institution of Gas Engineers. (Annual report and accounts to follow.)

11 a.m. to 12 noon.—Presentation and discussion of 'Utilisation Efficiency of Industrial Gas Appliances,' by E. A. K. Patrick.

Visits in afternoon to the Beckton and Romford works of the North Thames Gas Board; the Leatherhead station of the British Coal Utilisation Research Association; the Luton works of George Kent, Ltd.; the Coryton refinery of Mobil Oil Co., Ltd.

3 p.m. to 5.15 p.m.—Ladies' dress show and tea at the Monico Restaurant.

7.30 p.m.—Opera performance, 'Elektra' (Richard Strauss), by the Covent Garden Opera, at the Royal Opera House, Covent Garden.

8 p.m.—Pianoforte recital by Claudio Arrau at the Royal Festival Hall.

THURSDAY, MAY 15

10 a.m. to 11 a.m.—Presentation and discussion of 'By-Products in the Economy of Gas Manufacture,' by L. W. Blundell.

11 a.m. to 12 noon.—Presentation and discussion of 'Work Study: Three Years' Progress at Edinburgh,' by David Beavis.

12 noon to 12.15 p.m.—Concluding business of meeting.

12.30 p.m. for 12.45 p.m.—Council luncheon to the President.

Visits in afternoon to the Beckton and Romford works of the North Thames Gas Board; the Osram lamp and glass works of the General Electric Co., Ltd., Wembley; the Gothic works, Edmonton, of Glover and Main, Ltd.; Hampton Court Palace (ladies).

7 p.m. (subject to confirmation).—Opera performance 'Don Carlos' (Verdi) by the Covent Garden Opera, at the Royal Opera House, Covent Garden.

8 p.m.—Recital by the Oistrakh Trio at the Royal Festival Hall.

FRIDAY, MAY 16

Visit to Oxford and Blenheim Palace.

Clean Air Year Book

THE coming into force on June 1 of the remaining sections of the Clean Air Act adds to the value of the new edition of the Clean Air Year Book, which has been published by the National Society for Clean Air.

It contains a considerable amount of information about the Act and related matters, together with much other general and technical information about the problem of air pollution, with lists of recent papers, publications and a directory of organisations interested, in one way or another, with the subject. Many readers will find uses for a synopsis of the clean air case, prepared for 'the guidance of speakers, writers, teachers, etc.'

The Year Book contains also the Society's own annual report and information about its organisation and activities. The report, discussing the Clean Air Act, is optimistic. 'The central government,' it says, 'has done much to ensure that the Act is in no way neglected,' and adds, 'How industry as a whole will meet the challenge of the Act remains to be seen. As far as the more progressive sections are concerned, particularly at the technological level, the indications are encouraging.'

The Year Book may be obtained from the Society at 2s. (or 2s. 4d. by post) from its offices at Palace Chambers, Bridge Street, London, S.W.1.

From the Chairman's Address to the Manchester and District Section, I.G.E., April 18.

The Future Needs a National Fuel Policy

By J. G. TILLEY, M.Inst.Gas E., M.Inst.F.,
GROUP GENERAL MANAGER, HUDDERSFIELD-HALIFAX GROUP,
NORTH EASTERN GAS BOARD.

IF attention is first given to an item which demands priority it might well be the necessity, in the interests of both the community and the gas industry, to find ways and means of making a really worth while reduction in the cost of gas to the consumer. To this end increased productivity and savings in costs have been obtained by all boards and it is gratifying to learn that this has been duly noted at Government level.

It seems clear, however, that the work already accomplished in centralising production into economic units and in improving plant and processes has raised the standard of conventional methods of gas manufacture to such a high level of efficiency that any further gains will only be small and while they are very important they can have only a negligible effect on a Board's costs.

Cheaper processes are therefore vital, and during the year it is hoped to present information to this District Section on some new developments. Details available to date, however, suggest that there is at present no known way, including the importation of liquid methane, of making a dramatic reduction in the cost into holder, unless, of course, the search for natural gas proves more productive than present indications suggest. Further, large capital sums have been invested in conventional plant in recent years and even if this plant was scrapped in favour of newer methods the interest and depreciation charges would have to be met for a considerable period hence. There is no sign, to say the least, of any reduction in the cost of labour and raw materials, and one is therefore forced to the conclusion that for several years there can be no further major saving in overall production costs.

Distribution systems have also been greatly improved, though here the gain has, of necessity, been rather in enhanced consumer service than in measurable savings in costs. In a period of inflation all other costs (*i.e.*, general consumer service, rendering and collection of accounts, administration and general charges, contributions to Gas Council, contributions to Central Guarantee Fund, rates, employees' welfare, depreciation and interest payable) have increased, and if a board's accounts are divided into two main groups, *i.e.*, (a) net cost of gas and products and (b) all other charges, it will then be noted that the latter have risen much more steeply than the former. The Gas Council's Summary Schedule II, which gives average costs for the twelve boards, has been taken to illustrate this point over the past six years.

		(a) Net cost of Gas and Products. Per therm sold.		(b) All other Charges. Per therm sold.
1956-57		10.68d.		8.06d.
1950-51		8.22d.		4.63d.
Increase ...		2.46d.		3.43d.
	or	29.9d.	or	74.0%

In group (a) at least we have the hope of new processes, in group (b) only the most careful pruning has kept costs down to their present level. But in group (b) there is one obvious way to reduce costs. Many distribution systems can carry far more load than they are now doing. The volume of gas supplied to existing consumers could probably be doubled without any such corresponding increase in expenditure, and when all aspects of consumer service costs and other overheads are taken into consideration, there might well be an important saving in these circumstances, possibly even pence per therm.

We have already had a valuable illustration. It is a well-known fact that since 1939 the price of gas to the consumer has increased much less than many other commodities. A very important factor in this, apart from the benefit obtained from pre-war capital expenditure, has been the increase in total sales over the same period, though not in consumption per domestic consumer—had this latter been achieved our position would have been much better than it is today.

Expanding sales give us at least a fair chance of absorbing increases in costs (assuming inflatory trends continue) and possibly even a chance of reducing the price of gas. Static, or worse still, diminishing sales of gas can only result in increased selling prices with even further detrimental consequences.

Thus the greatest possible emphasis must be placed on expanding the sales of gas, in other words, on selling.

Competition : Fuel Policy

If, then, it is so important to expand our sales, and particularly to existing consumers, let us ask why we are not doing so. Reasons frequently quoted are:—

(a) Intensive competition from other fuels, notably electricity and oil.

(b) Purchase Tax on space heating and other appliances.

(c) Changes in social habits, *e.g.*, the growing tendency for large-scale cooking in lieu of domestic cooking.

(d) Improved efficiency of modern gas appliances ('Four Therms do the work of Five').

(e) In some portions of the North Eastern Gas Board's area there is a declining population.

There may be other reasons. They are all formidable. They need not all, I suggest, be insuperable.

The gas industry is not, and never has been, frightened of competition from other fuels. Our competitors have some good appliances and strong selling points. We cannot complain about that, it is our job as an industry to produce better appliances than our competitors, to have better selling features and better salesmanship, but there is a strong case for Government intervention on the lack of a national fuel policy which is giving basically unsound advantages to the electrical industry.

Fuel policy must obviously take into account the foreseeable years ahead. Various investigations into future energy requirements differ in detail but they all lead to the conclusions:—

(a) There is a close relationship between the energy requirements of a country and its standard of living. Power to the elbow in the United States of America is twice that in the United Kingdom. If standards continue to rise energy requirements will also rise.

(b) To meet this increased demand for energy in the next 15-20 years, and despite the ambitious nuclear energy programme, the United Kingdom will be obliged to maintain, and even increase, its output of coal and to make use of substantial quantities of imported petroleum.

Clearly then there is room for all the fuel industries to expand, but it is essential that they should do so in such a manner as will ensure all possible economies in basic coal consumption. While the tendency is now to revise long term energy estimates downwards, the principle is not affected.

Electricity.

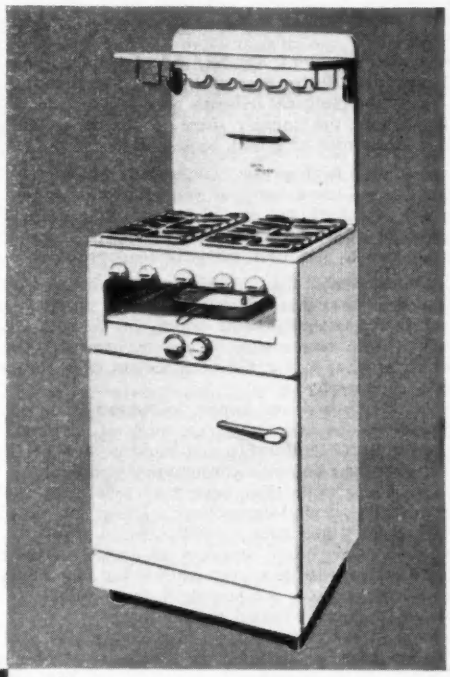
It is well known that the gas industry has three attributes of great economic importance:—

1. We process coal at over three times the thermal efficiency of the electrical industry.

WORLD

the way

with four outstanding cookers



THE FORTY ONE

A low price family cooker which should have a great appeal in the popular market.

THE RANGETTE

Automatic hotplate ignition, folding Comfort-Level Grill, raised oven, warming chamber, storage compartment. Only 32½" wide.

leads the way

Bigger than ever National advertising campaign, with pages in full colour, started with the March issues of the leading Women's Weekly and Monthly Magazines.

2. In overall utilisation (space heating for example) gas for equivalent thermal output uses only about one-half of the net amount of coal that heating by electricity would use.
   To illustrate this point it has been calculated, for domestic use alone, that if the energy supplied for heating and cooking by the electrical industry were to be replaced by gas throughout the country there would be an annual saving in the order of 2 mill. tons of coal.
3. For providing a heat service, domestically or industrially, the Gas Council has shown that gas requires only approximately one-third of the capital investment required by the electrical industry for the same amount of heat. This is largely due to the electrical peak load problem.

The gas industry has thought for a long time that the aspect of net coal consumption and by-product recovery was in itself sufficient to justify some action in the way of a national fuel policy. Surely when the capital investment position of the country is, and is likely to remain, very difficult, action becomes imperative.

Yet an electricity board well known to me are doing everything in their power, by intensive selling methods, by commercial pressure on Local Authorities and builders, and by their tariffs, to increase their domestic consumption—particularly by appliances which aggravate their peak load thus creating the need for even further capital expenditure. Under the guise of 'freedom of choice' they have virtually forced many Local Authorities and other house builders to install additional wiring plus expensive switchgear even when it has been obvious that it would not be used, incidentally causing people other than themselves to incur wasteful capital costs.

In attempting to justify their policy a senior official of this particular Board recently stated that the economics of domestic electricity supply were 'extremely complex.' No one would wish to deny an Electricity Board a fair return on their capital. To attempt to compel consumers to use this or that fuel is completely foreign to our democratic way of life. But is it not reasonable to suggest that if a consumer chooses to use a fuel for purposes which can be shown to be a national luxury at the present time (*i.e.*, purposes which aggravate the electrical peak load) he should be expected to pay a luxury price? Is it not reasonable to save capital expenditure by channelling domestic peak loads to fuels other than electricity, thus releasing electricity for industrial power expansion?

In practice precisely the reverse applies. Electricity tariffs and policies as now constituted encourage loads which in the ultimate analysis are in conflict with national fuel efficiency and it is clear that only a Government directive can remedy the present situation.

Oil.

Whether or not it is nationally desirable to encourage the use of ever increasing quantities of oil for heating purposes is a matter involving economic and political factors which are outside the immediate scope of this address, though we cannot afford to overlook the fact that oil fuels which are a by-product of petrol are likely to increase in availability as the demand for the latter rises.

The position, however, is that the 'suggestion' to public authorities made by the Ministry of Education in their Building Bulletin No. 13 that oil should be used for central heating has not to my knowledge been withdrawn and there is ample evidence that this Government influence has made our competitive position more difficult.

Competitors have been quick to take advantage of their opportunities. Electrical and oil appliances have been improved in performance and appearance and the oil companies have developed door to door deliveries of paraffin (glamorised, please note, in pretty colours and with improved smell) to a much greater extent than one might at first imagine.

In 1950, 500,000 oil heaters were sold. The current figure according to a Press report is of the order of 3 mill. To put this latter figure in its true perspective the *total* number of main gas appliances sold in 1956-57 by the 12 area boards, *i.e.*, cookers, water heaters, space heaters, wash boilers, washing machines and refrigerators, was 1,049,317.

The Treasury's year end 'Bulletin for Industry,' published in December, 1957, states the following in respect of goods and services bought by the personal consumer, '. . . the volume of consumers' expenditure on electricity in 1955-56 was nearly four times that of 1938. Expenditure on gas was up about one-third . . .'

May I return to an earlier point. If, as a nationalised industry it could be shown that we were not making a useful contribution to the national well being, we could expect sooner or later to be closed down. But in fact our rôle is, and is likely to remain, a vital one and in consequence it is not unreasonable that appropriate national support should be given to us.

I am very well aware that there is nothing new in all this—it has been said many times before but without any change taking place. That is why the subject must be kept alive.

Prospects

Let us suppose for a moment that we had a little support from a national fuel policy. By this assistance and our own endeavours there is much that can be done to expand gas sales. Opportunities for both gas and coke arise from the following circumstances:—

(1) If the standard of living of the majority of the population continues to rise, more fuel, as previously indicated, will be used in the home.

(2) Even if no such further rise takes place the public today has far more money to spend than ever before.

(3) The present lack of domestic amenities may be summarised:—
   (a) The average British home is not well heated.
   (b) According to an estimate made by the Ridley Committee more than 40% of the houses in this country were without piped hot water. The position in 1958 cannot be greatly different.
   (c) A much higher percentage are without refrigerators.
   (d) Every electric cooker and every solid fuel cooker offers an opportunity to sell a ring burner or a hot-plate if gas is available—and do not let us despise the load these minor appliances can bring.
   (e) There are still many people without a gas poker.

(4) The advent of smokeless zones.

(5) Communal developments, *e.g.*, launderettes, multi-storey flats, etc.

(6) Commercial opportunities other than those arising through smokeless zones—the need for clean food, washing facilities in shops, etc.

(7) The new appliances we now have to meet the foregoing, *e.g.*, automatically controlled warm air furnaces, more efficient convector fires, refrigerators that are substantially cheaper than any other such appliance on the market.

(8) Industrial opportunities—in certain fields we have positive advantages over competitors.

(9) The increasing insulation of buildings which widens the scope for higher priced fuels.

This list, no doubt, is not exhaustive. Even so it is highly encouraging.

If we accept the theory that our social developments are following American practices, we can use the current American scene to forecast future trends in the United Kingdom. All reports have indicated a most outstanding item which should have great possibilities for us, even allowing for different conditions, *i.e.*, warm air heating. This load, of great importance in itself, has the added attraction that it can bring other loads with it, *e.g.*, water heating, clothes drying and gas fires for occasional heating, in addition to other normal requirements.

It may be argued that the load has only been obtained because the Americans had cheap natural gas. Undoubtedly this has been a most valuable asset, but on, for example, the North Eastern Gas Board's domestic two part tariff, automatic selective warm air heating can be operated at a cost which compares favourably with any other fuel.

With a supply of warm air to the ground floor only (and it has been demonstrated that there is a useful escape of warm air to the upper floor) the first cost can be substantially less than conventional central heating. In thousands of existing houses it can be very little more than that of a television set.

Given hire purchase facilities surely we can sell this idea. We cannot offer the sales feature of really cheap running costs—yet. But if the story is put over properly there should be a tremendous appeal on the grounds of comfort and saving in labour. Let us remember, however, that it is precisely these latter points which will feature in the selling of competitive fuels.

Another social change is taking place and one which is at once a threat and an opportunity to the gas industry. The trend to various forms of communal services, *e.g.*, catering and laundering, or to re-housing in multi-storey flats means a definite loss of gas load unless we obtain the business in its new form.

In connection with multi-storey flats in particular there is a real opportunity to obtain substantial load. Conventional central heating presents recurring problems as between the landlord and his tenants in respect of the fairness of the charge for heat supplied. Heating under the individual control of the tenant has a definite appeal—provided the first cost is competitive.

In an actual scheme providing for each flat a gas fired warm air furnace, gas cooker, gas wash boiler, gas water heater and a drying cabinet (all flued into a Se-Duct) it was shown that the overall cost including carcassing was substantially less than providing similar facilities by any other means. On an attractive two part tariff the tenant can obtain competitive running costs, and the board a substantial consumption per consumer.

Appliances.

We have cause to be very grateful to those manufacturers who have devoted much time and money to the development of new and interesting appliances knowing, as they must have done, that initial returns would be poor.

In some sections of the market low selling price is of obvious importance, and ways and means (already achieved with a refrigerator) are urgently required to produce this result. On the other hand there is, as previously indicated, excellent scope for the high priced, fully automatic type of appliance.

The common factor to these extremes is that appearance, whether obtained through design, materials or colour, must be most attractive. If this requirement is incompatible with a satisfactory selling price it might well be that some further form of standardisation will become necessary, a method adopted by other industries with conspicuous success.

No reference to appliances could ever be complete without drawing attention to the disadvantages occasioned by the presence of organic sulphur compounds in town gas. Since Vesting Date capital has been required for other items of plant. It may well be that new manufacturing processes will help in this problem, but a buyers' market makes it even more important to remove this weakness.

I also feel that ways and means will have to be devised to bring about a higher standard in the maintenance of consumers' appliances than that which now generally exists. Sulphur-free gas will, of course, assist in this problem.

Coke.

I have referred more particularly to the sales of gas because of the importance of expanding this load but it should never be assumed that apparently favourable conditions, *i.e.*, the advent of smokeless zones, can allow us to relax in our efforts to market our other main product, namely coke.

The policy of the North Eastern Gas Board has been to concentrate in the first place on the improvement of facilities for the production of large quantities of high grade well screened coke of what may be termed the conventional type. Operationally the greatest emphasis is necessary at all times with our own employees to ensure that only a first class coke is actually allowed to leave the works. Nothing is more harmful than to persuade a potential consumer to try coke—and then to deliver to him an inferior product, or the wrong size.

Sales and Service

If we wish to expand in the strong buyers' market which exists today it is important to give urgent attention to the function of selling in all its aspects. It is not my purpose on this occasion to deal with selling methods except to say that I firmly believe that, like the suppliers of paraffin, we must find ways to present to the public an old story in a new and striking form; that we must analyse our prospects and then attack them strongly and quickly.

To do this we must have the right type of man properly trained in salesmanship. For many years the Institution has provided a qualification in this important subject, but to date it has been attained by far too few of our personnel.

The industrial engineer is also essentially a salesman. In the past he was generally trained as a technician—and then left to acquire the art of salesmanship in the hard school of experience, a process which can involve the risk of lost business.

Good personal qualities and qualifications are essential in all spheres of our activities—it is not sufficient to have first class men at the top, a high standard is necessary at all levels—and in no case is this more true than in salesmanship. When selling is difficult, high calibre men well trained are vital.

In consumer service—and I use the term in its widest meaning—it is obviously essential that we give of our utmost at all times, by all departments and by all employees. Expeditious attention is not enough—how it is done matters very much. It is a sad reflection on public service as a whole when sometimes (though not often) a consumer, in a rather surprised sort of way, expresses appreciation for courteous and prompt treatment, for a well written letter, or even for a polite reminder that payment is overdue. Here then is another opportunity, constantly to ensure that our reputation is of the highest order so that we may be known as good people with whom to deal.

Conclusion

Evolution is not a rapid process. Thirty and more years ago Presidents of the Institution of Gas Engineers were referring in their Addresses to subjects such as:—fuel policy, electrical competition, difficulties in selling to Local Authorities, progress of the gas industry in America and Canada, improvements in appliances, the need for better tariffs, coal quality, research, education, fatalities from carbon monoxide poisoning, and many other similar items of which we hear much today. The scenery has changed. The plot it seems is as before.

One may reflect, and take a little comfort from the thought, that in spite of past difficulties—and no doubt they were as great in their day as current problems are to us—the gas industry has survived and prospered. What we do not know is how much better the industry and the country would have been if, for example, a realistic national fuel policy had been in operation.

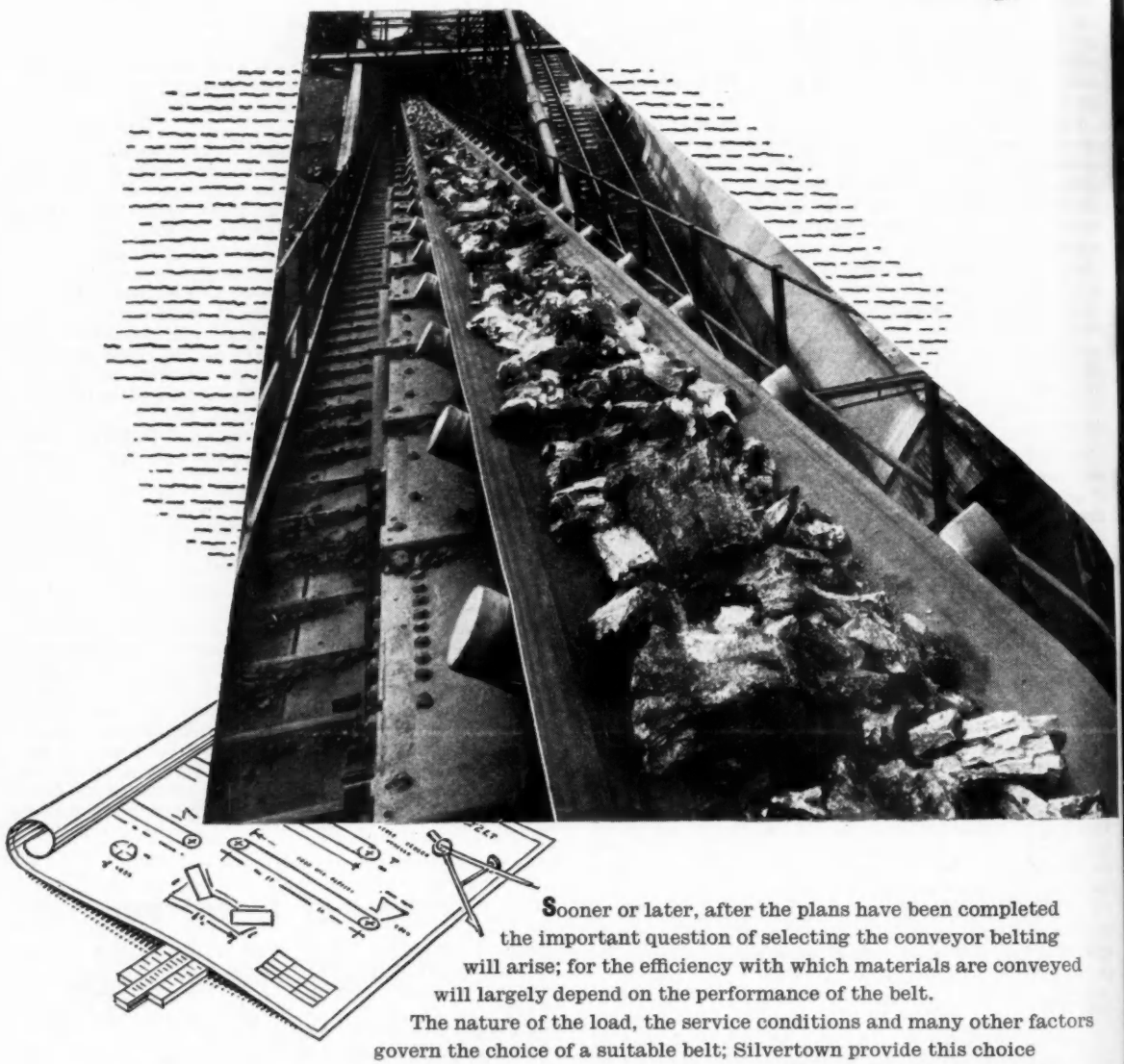
Survey of Corrosion

THE NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE), of Houston, Texas, have published their 1954-55 Bibliographic Survey of Corrosion. A selection of 4,287 abstracts of articles on corrosion and corrosion prevention published in 1954-55 are compiled in this volume, which is the sixth in the series. Also included are a number of abstracts published from 1945 to 1953, which were not available for use in earlier bibliographies. Material was selected from abstracts compiled by 23 agencies covering literature internationally.

Abstracts are arranged topically according to the NACE abstract filing index, formulated over several years by experts in the field of corrosion, which divides the literature into eight main groups: General, testing, characteristic corrosion phenomena, corrosive environments, preventive measures, materials of construction, equipment and industries. Each main group is sub-divided and topical cross-references are appended.

The subject index, in addition to terms in the NACE abstract filing index, lists many metals and alloys by trade name and indexes them as to specific properties and to behaviour in specific media. An author index is included. Referencing is to classification and serial numbers of abstracts for ease in searching. An appendix has been included to aid the user in locating and obtaining copies of unfamiliar foreign or domestic journals.

The selection of conveyor belting



Sooner or later, after the plans have been completed the important question of selecting the conveyor belting will arise; for the efficiency with which materials are conveyed will largely depend on the performance of the belt.

The nature of the load, the service conditions and many other factors govern the choice of a suitable belt; Silvertown provide this choice from a full range to meet every application. This range is backed with a technical advisory service to aid you in all matters of selection.

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